AD-A165 727 WEST COAST OCEAN CONSTRUCTION PLATFORM PRELIMINARY DESIGN STUDY VOLUME 2..(U) GLOBAL MARINE DEVELOPMENT INC NEWPORT BEACH CA JUL 78 GMDI-040072-001-VOL-2 1/6

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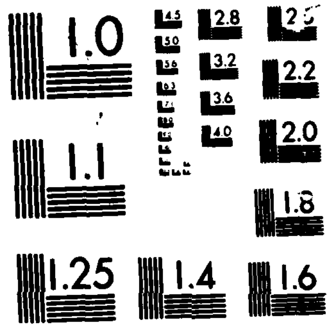

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WEST COAST OCEAN CONSTRUCTION PLATFORM PRELIMINARY DESIGN STUDY

VOLUME II (APPENDICES)

FPO - 1-78(9)

JULY 1978

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OCEAN ENGINEERING AND CONSTRUCTION PROJECT OFFICE
CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C. 20374

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16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if nec.)
FIELD	GROUP	SUB-GROUP	Platforms, Ocean construction

19. ABSTRACT (Continue on reverse if necessary & identify by block number)
This study forms part of the overall work being carried out by the Naval Facilities Engineering Command to determine the most cost-effective method of performing ocean construction work on the West Coast of the United States and in the Hawaiian Islands. The study was divided into two parts: (Con't)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT SAME AS RPT.	21. ABSTRACT SECURITY CLASSIFICATION
22a. NAME OF RESPONSIBLE INDIVIDUAL Jacqueline B. Riley	22b. TELEPHONE 22c. OFFICE SYMBOL 202-433-3881

DD FORM 1473, 84MAR SECURITY CLASSIFICATION OF THIS PAGE

BLOCK 19 (Con't)

1. Develop preliminary design configurations and conversion cost estimates on two platforms capable of perfoming the ocean construction work;

2. Supply performance schedules and oeperational costs for three specific methods for performing the ocean construction work.

FPO-1-78(9)

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WEST COAST OCEAN CONSTRUCTION PLATFORM

PRELIMINARY DESIGN STUDY

(GMDI REPORT NO. 04072-001)

VOLUME II

(APPENDICES)

PREPARED BY

GLOBAL MARINE DEVELOPMENT INC.
4100 Mac Arthur Boulevard
Newport Beach, California 92660

JULY 1978

PREPARED FOR

NAVAL FACILITIES ENGINEERING COMMAND
CHESAPEAKE DIVISION
OCEAN ENGINEERING AND CONSTRUCTION PROJECT OFFICE (FPO-1)
UNDER CONTRACT NO. N62477-78-C-0004

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APPENDIX

QUALITY INSPECTED 3

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DTIC	TAB	☐
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Justification		
By		
Distribution /		
Availability Codes		
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Per Mrs. Jacqueline B. Riley, NFEC/FPO-1

APPENDIX A

SCENARIOS AND DESIGN CRITERIA

SCENARIO 1

1 TIME PROFILE

Transit:	11 knots = 13 days one way		
Sea Trials:	= 9 days		
On Site:	Rigging for recovery & implant (2x13)	26 days	
Based on Fig 2 ● = 5 Δ = 4 * = 4 SW	Retrieve old array (5x1) & cable	5	
	Implant new array (9x1) & cable	9	
	Relocate shallow (4x1) water array	4	
		44 days	
	Weather Contingency (½) & transit between sites	22	
	TOTAL	66 days	

of which 27 days (18x1.5) are critical area of station keeping & accurate implantment operations

Weather criteria during critical operations:

Sea state 3 ($H_{1/3}$=4.9 ft @ 6 sec)

Waves (normal) $H_{1/3}$=6 ft

Winds $\leq$ 16 knots 75% of time

Currents < 1 knot

Station keeping/accurate implant criteria:

100-200' circle

2 CARGO LOAD AND WEIGHT

13 arrays 5 @ 18x18x19 Hi(folded) wt 35 L.T.

4 @ 10' dia base 7½ Hi 3 L.T.

4 @ 6' dia base 4 Hi 1 L.T.

Outreach over ship's side 15' min

(Divers to unfold arms)

Cable (IAW Scenario P.5)(3000x13) = 39K ft

(IAW Fig. 2) for arrays to be installed

(Δ) = 95K ft

Required 95K + (13-4)(3K) = <u>125K ft</u>

Requires 3 reels @ 12½ L.T. each & 8' Hi x 5 1/3' w

or

1 reel tank (20' dia x 7' Hi; 50 L.T.;)(P.27 Vol I)

Wt total = 100 L.T. including spare parts/stabilizers/etc.

Sq.ft./area totals =	1620	open dk space for lg arrays
	1000	cargo hold for remainder
or	2620	cargo hold w/ 20+' ovhd clearance

3RO-RO SPECIAL EQUIPMENT REQUIRED

2 - Pengo winches (35'x8' ea & 15 L.T.)

1 - Powered cable reel (9'x7')

1 - Camera sled

1 - Divers or small boat for near shore

4LIFTING CAPACITY MAX

Arrays	10 L.T.
Cable Reels	12½ L.T.
Cable Tank	50 L.T.
Cable Trencher	45 L.T.

5SUMMARY

$$\left.\begin{array}{ll}\text{Crew} & 23 \text{ to } 27\\ \text{UCT} & 15\end{array}\right\} \begin{array}{l}5200\ \text{ft}^2\\ \text{Hab + stores + offices/shops}\end{array}$$

$$\text{Fuel (avg)}\ \left[39 \text{ days } (400\ \text{HP}) + 27 \text{ days } (800\ \text{HP})\right]\ 24\ \frac{\text{hrs}}{\text{day}}\ \left(0.45\ \frac{\text{lbs}}{\text{HP-HR}}\right)/\left(54\ \frac{\text{lbs}}{\text{cu ft}}\right)$$

= 7,440 cu ft = 70% capacity

= 10,625 cu ft

= 250 L.T. diesel oil

Water (potable only) = 42 $(10 \frac{\text{gal}}{\text{man day}})$ 66 days
= 27,720 gal = 3700 cu ft = 100 L.T.

Water (1 FW sys, incl wash, potable
= 42 $(50 \frac{\text{gal}}{\text{man day}})$ 30 days
= 63,000 gal = 8400 cu ft = 235 L.T.

Cargo wt (incl eq) = 200 L.T.

Open dk space ≈ 3000 to 3500 sq ft

Hold space ≈ 2000 to 2500 sq ft

SCENARIO 2

1 TIME PROFILE

On site: 1 week
(Scenario 1 controls)

Weather criteria (any time of year):

Winds: ≤ 16 knots, 83½% of time

Currents: < .9 knot, 90% of time

Waves: $H_{1/3}$ < 6 ft Dec thru Apr 85%
May thru Oct 95%

2 CARGO LOAD AND WEIGHT

- Anchors (Danforths) 6,000(2) = 5.4 L.T.
- Anchors Clump 28,000(2) = 25 L.T.
- Anchors Sinker 6,000(2) = 5.4 L.T.
- Anchors Chain
  (14 shots 1¼") = 8.84 L.T.
- 1¼" wire rope 28,620 ft = 35 L.T.
  (on 8 reels (P.21)

(Space controlled by Scenario 1)

3 RO-RO SPECIAL EQUIPMENT REQ

1 - Verne cross deck winch (22x10 & 25 L.T.)

1 - Cable handling winch (Skagit) (15x10, 16 L.T.)
2 - Powered cable stowage reel

4 LIFTING CAPACITY MAX

(1) Cable & reel = 7 L.T.
Dk winches = 25 L.T.
(1) Vertical leg = 20 L.T.

5 SUMMARY

Crew
Fuel
Water
Dk Space
(Scenario 1 controls)
Cargo wt ≈ 150 L.T.

SCENARIO 3

1 TIME PROFILE

(Scenario assumes small vessels apparently too small or not rigged to do total job without returning to port - Seacon should be capable of performing job without returning to port.)

Rigging for recover & implantation	23 days
Implanting operations	9 days
Weather contingency	5 days
	37 days

Of which 14 are critical station keeping up to 30 foot circle.

Weather criteria - equal to or less than Scenario 2.

2 CARGO LOAD AND WEIGHT

Anchors & clumps
A1, 2 & MA (1.5 kips ea) 2 L.T.

A3 (1.7 kips ea)	3/4 L.T.
A4, 5; CM1, 2, 3 (1.8 kips ea)	4 L.T.
Buoys (7) (3.0 kips ea)	10 L.T.
(1) (5 kips ea)	2¼ L.T.
Cable & wire 34 kips (encl reels)	15 L.T.
	33 L.T.

(Size controlled by Scenario 1)

3 RO-RO SPECIAL EQUIPMENT REQ

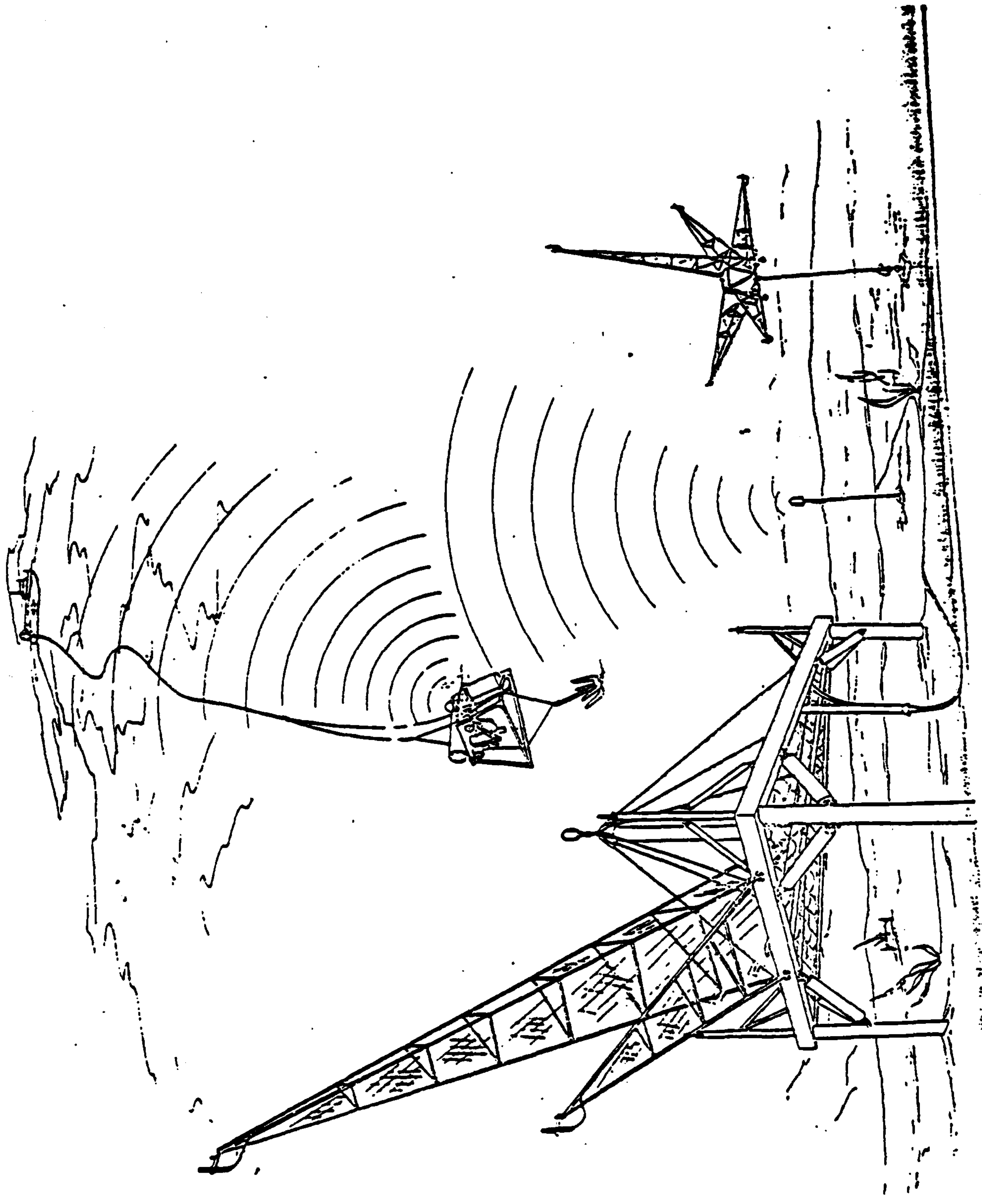
2 - Pengo winches
2 - Power cable reels
1 - Camera sled
1 - Divers or small boat to assist

4 LIFTING CAPACITY MAX

Cargo Max - 5 L.T.
Deck Eq - 15 L.T.

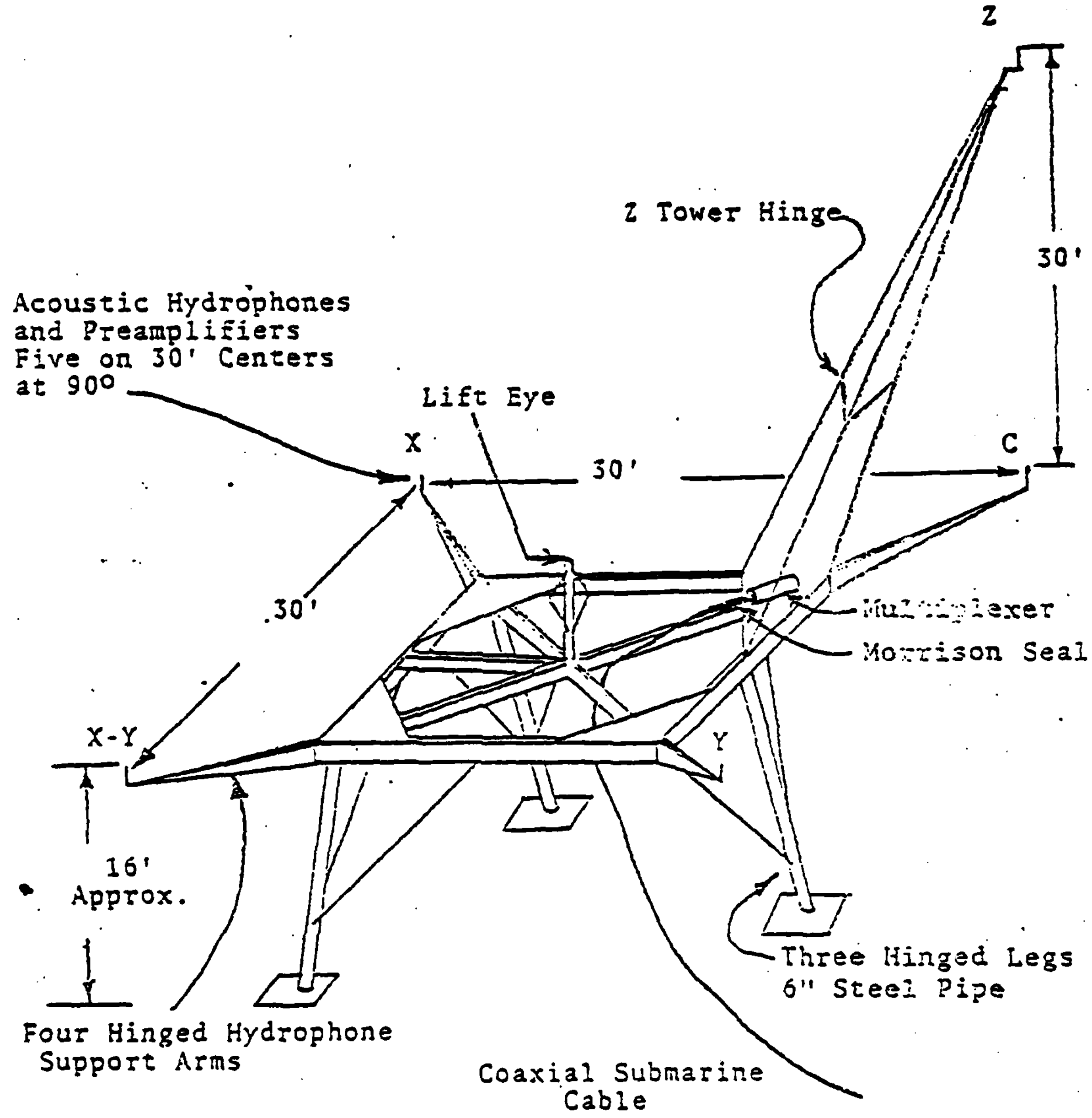
5 SUMMARY

(Scenario 1 controls)



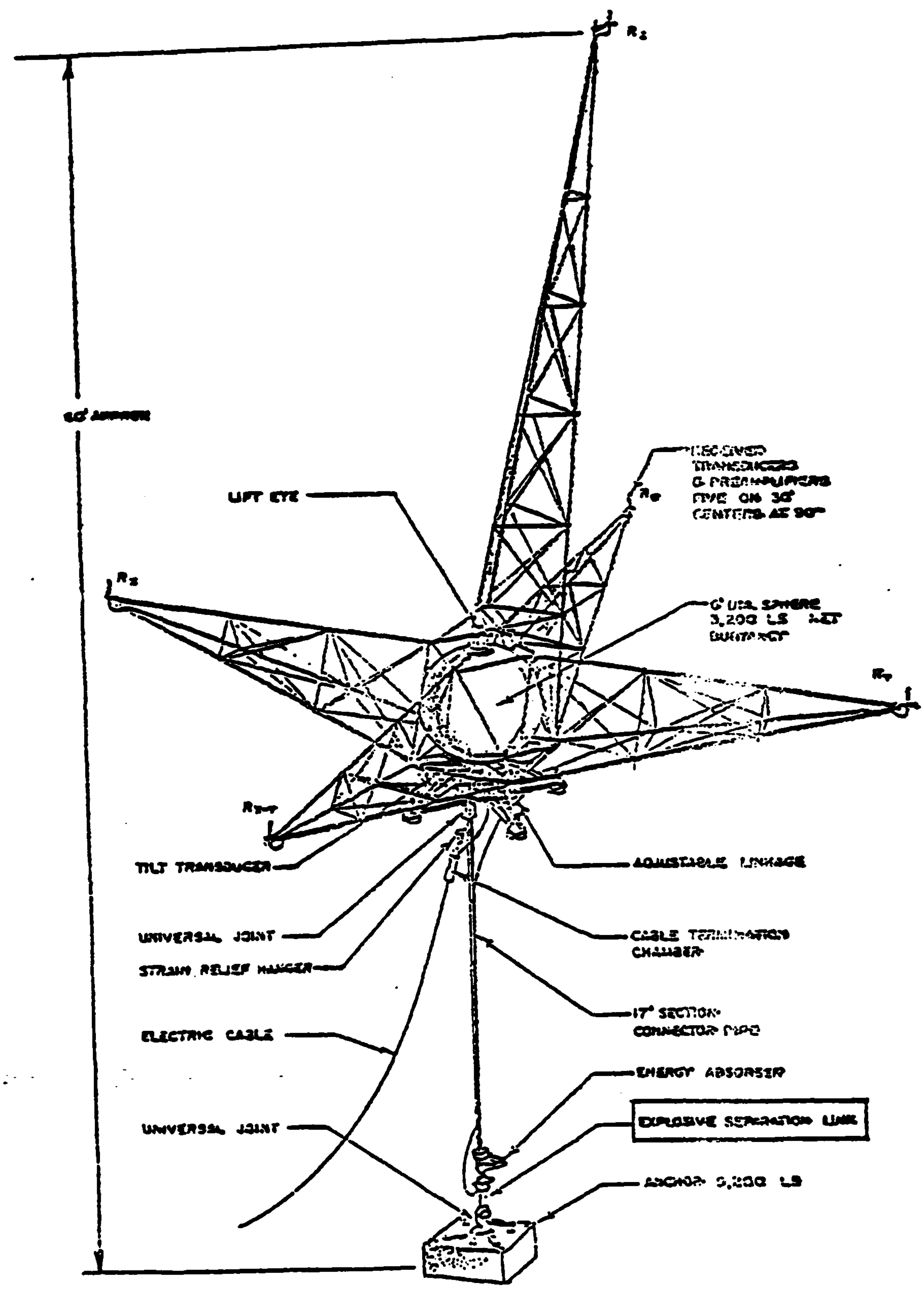
SCENARIO 1

Array Implant Operation

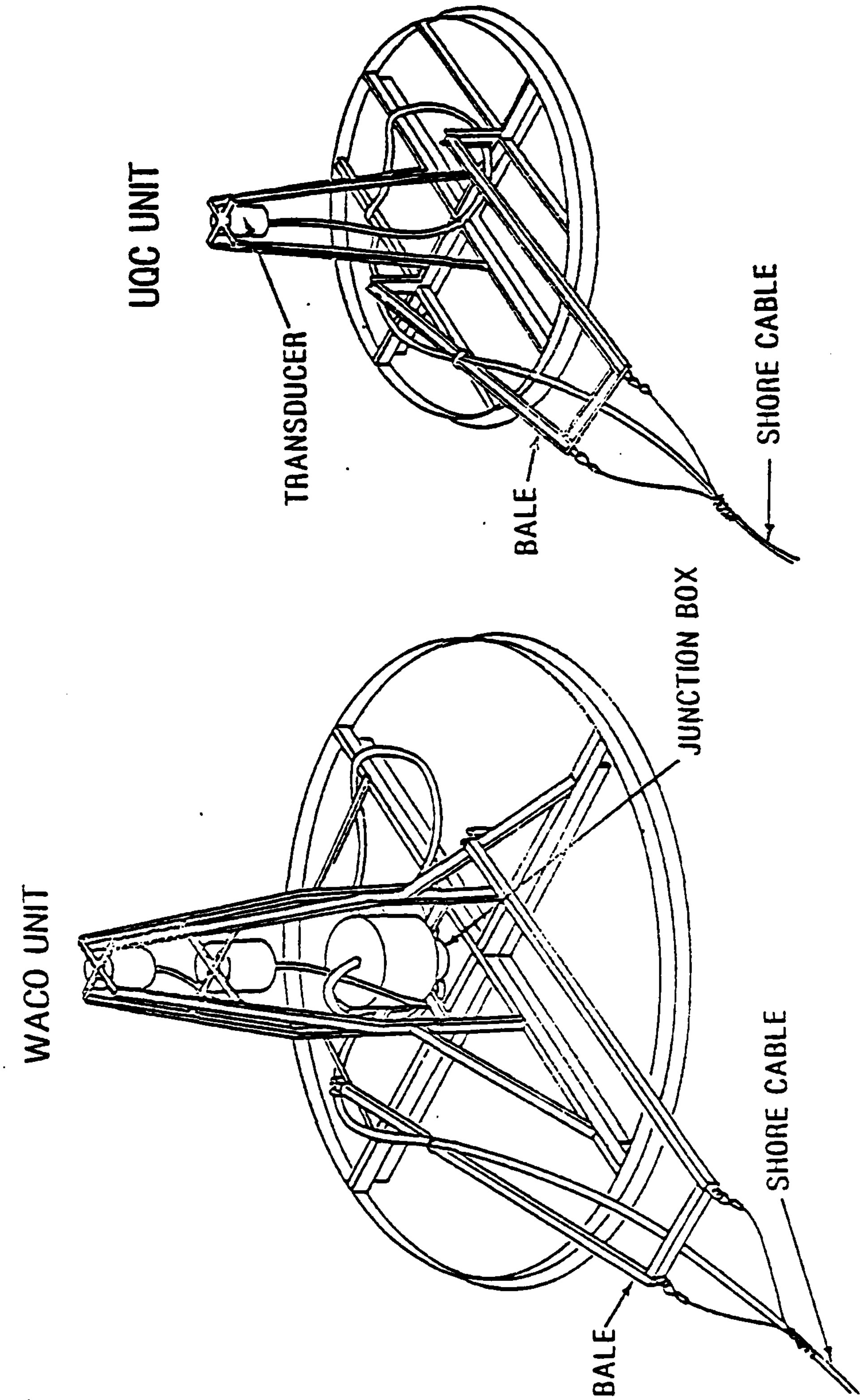


SCENARIO 1

Non-buoyant Array Configuration

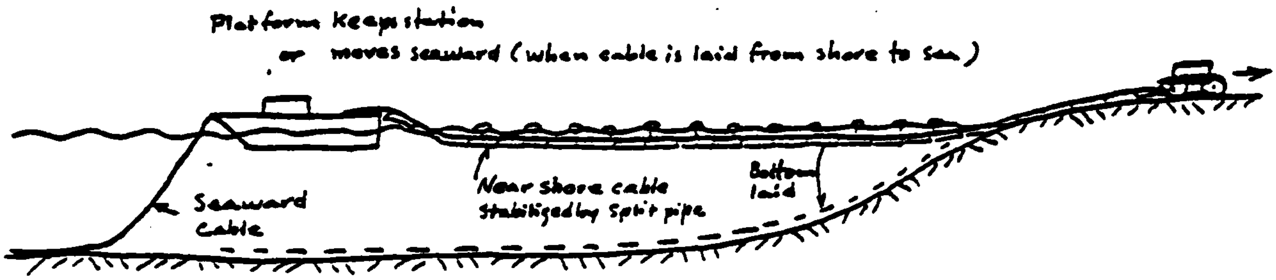


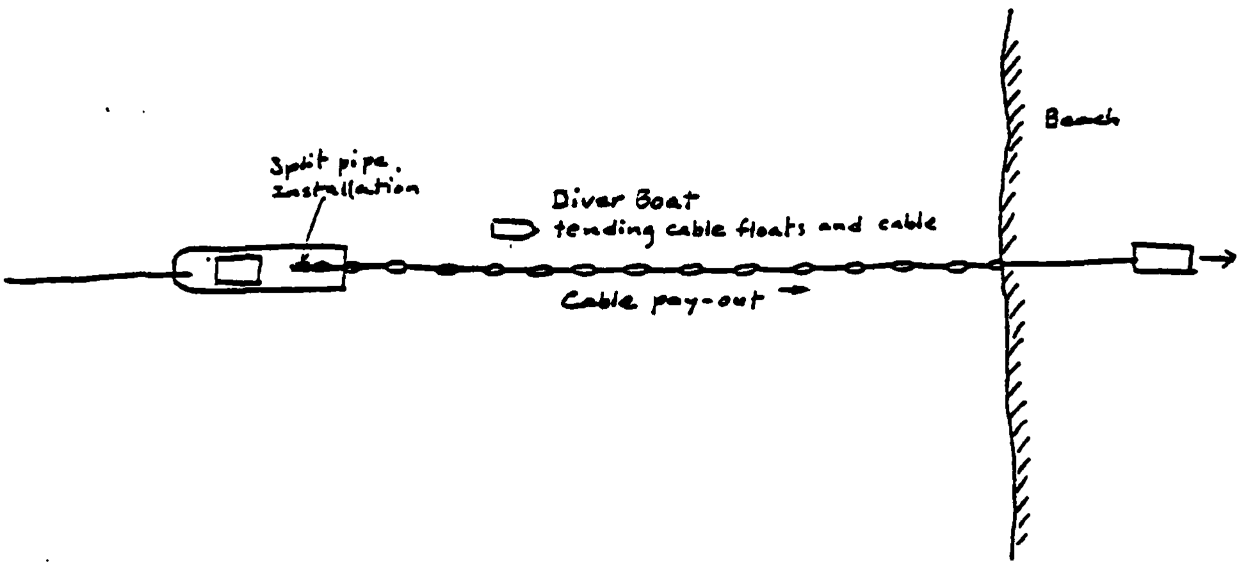
SCENARIO 1
Buoyant Array Configuration



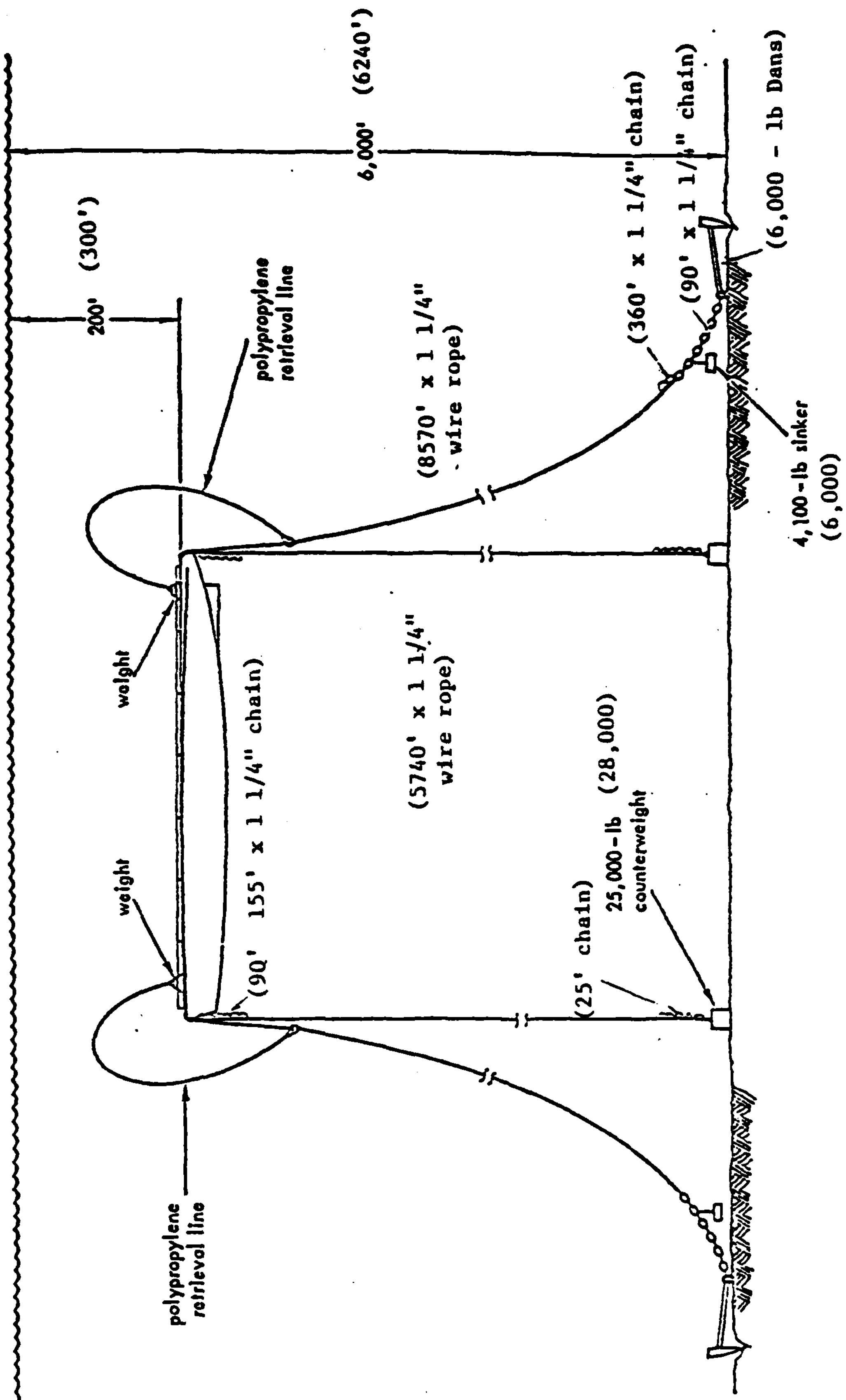
SCENARIO 1

WACO and UQC Array Configuration





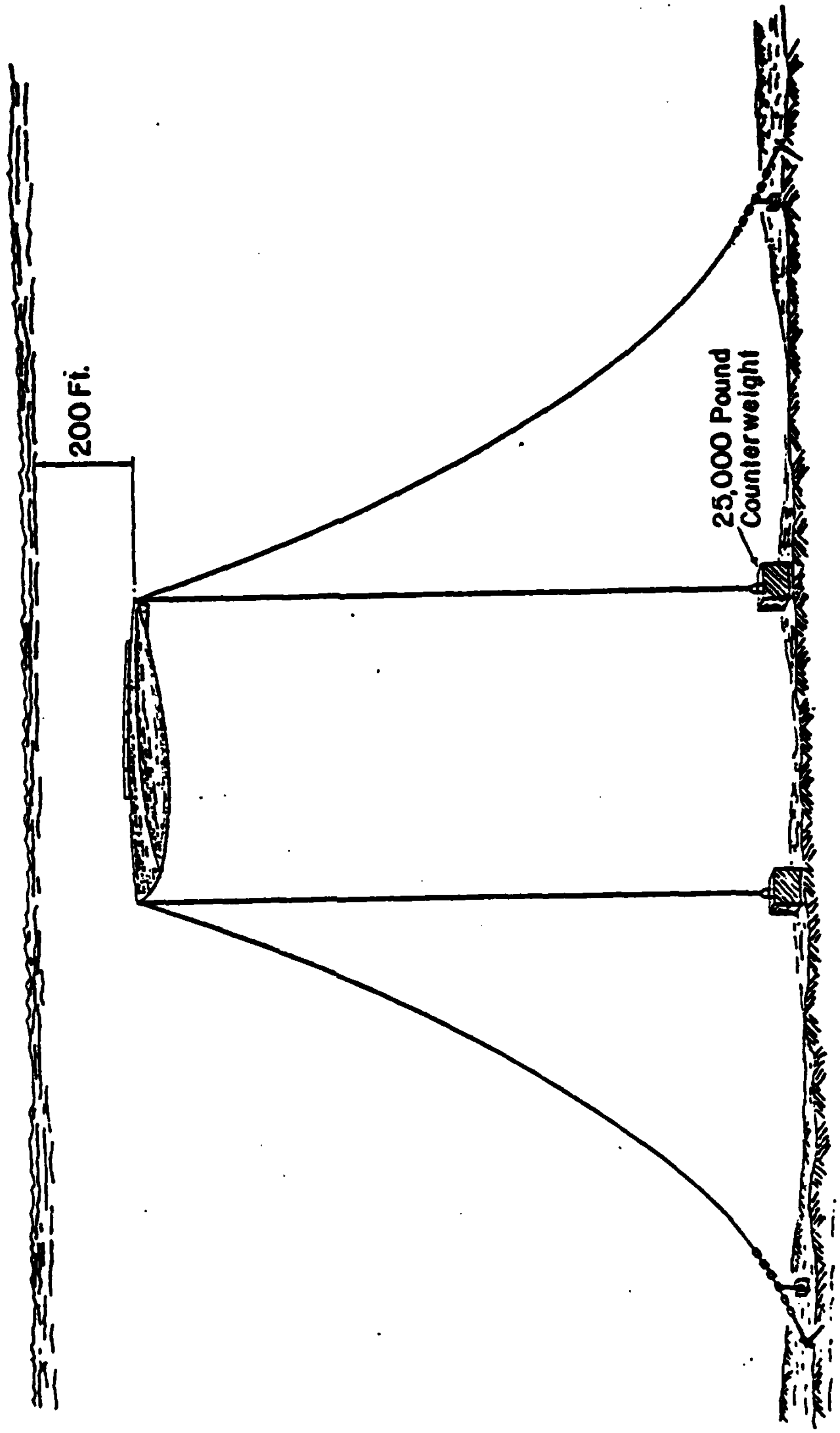
Cable Laying Near Shore



*Note: The parenthesized data are for design alternative to those given in Appendix C1.

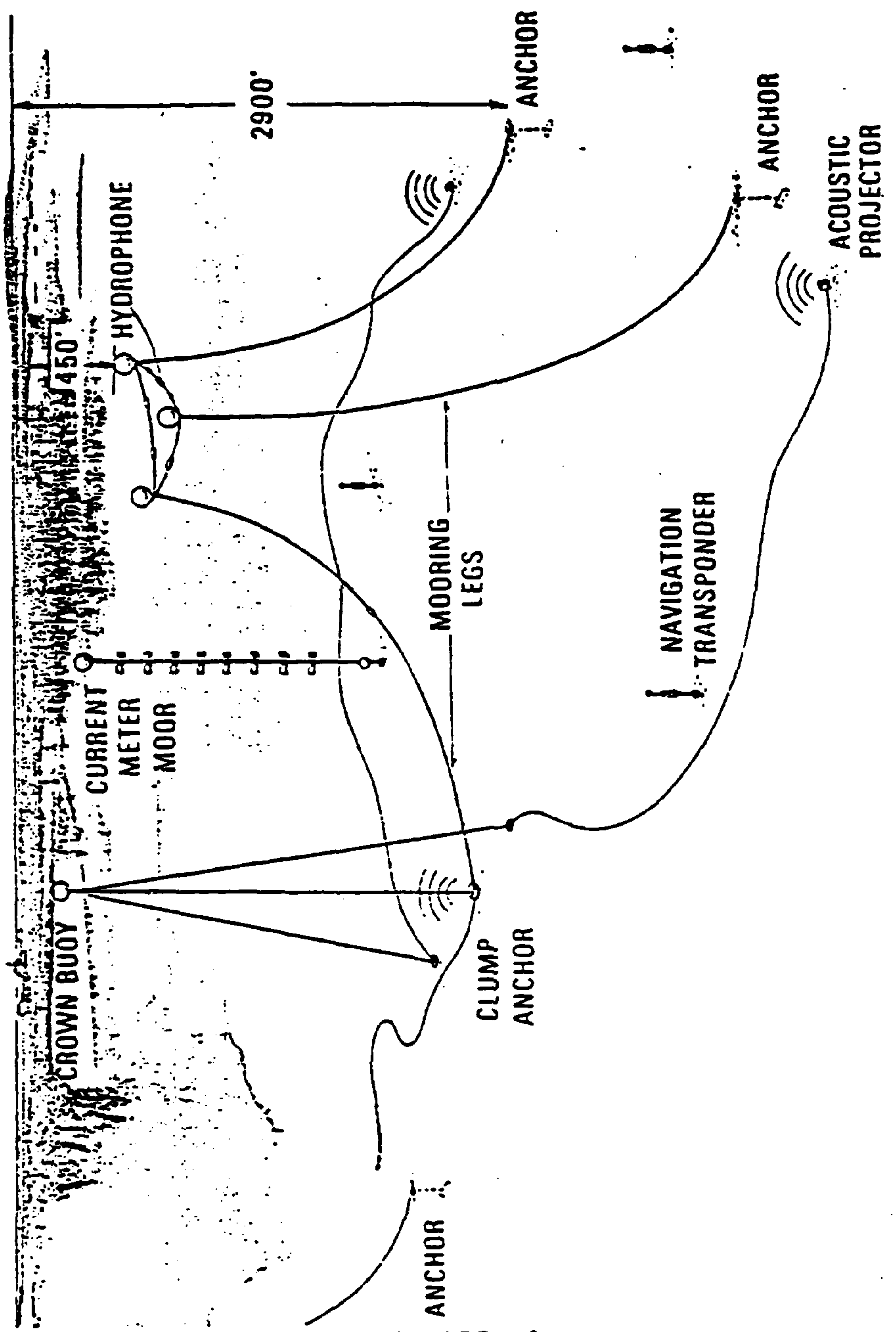
SCENARIO 2

SQUAW anchorage System.



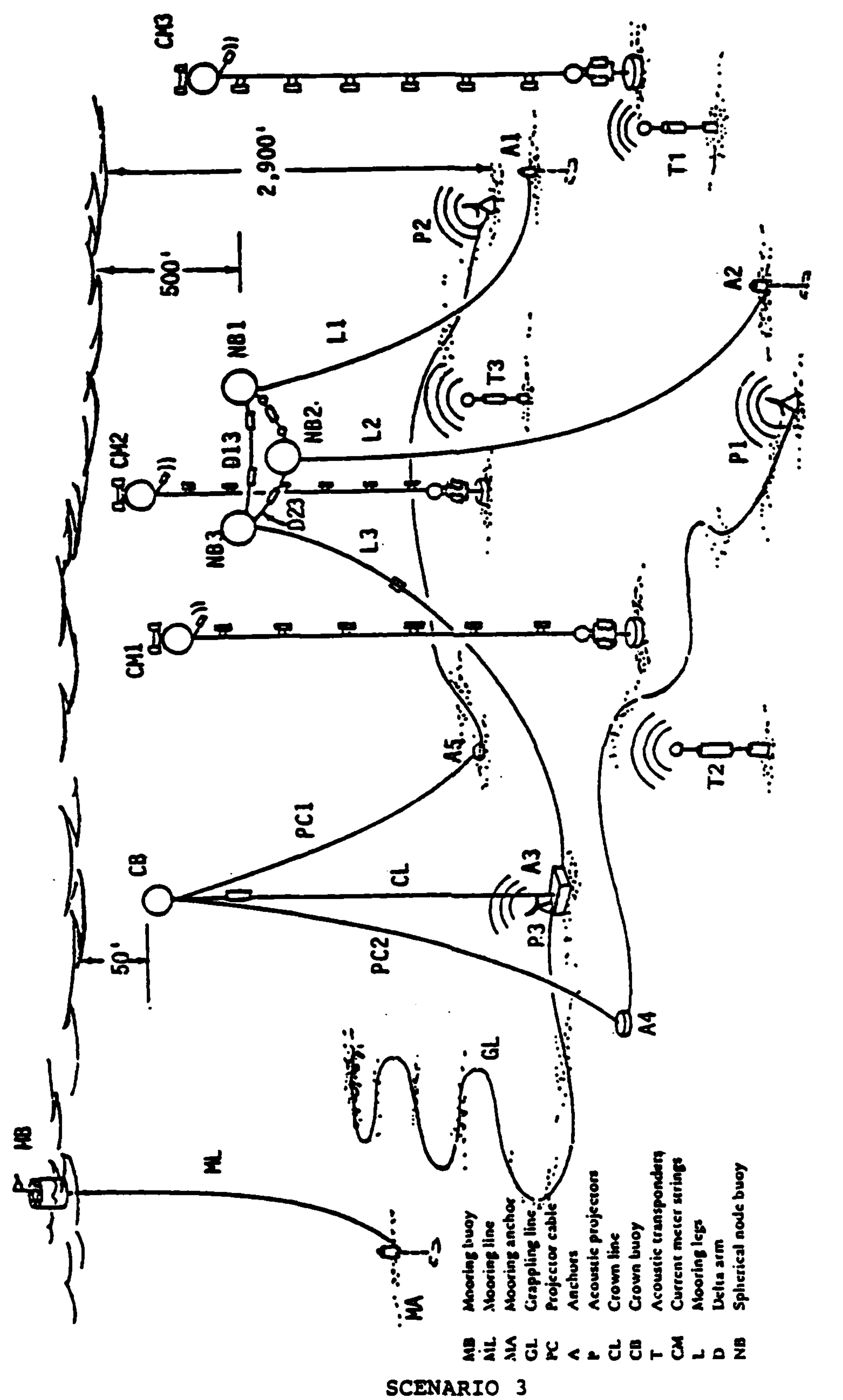
SCENARIO 2

Final Configuration of the SQUAW Mooring



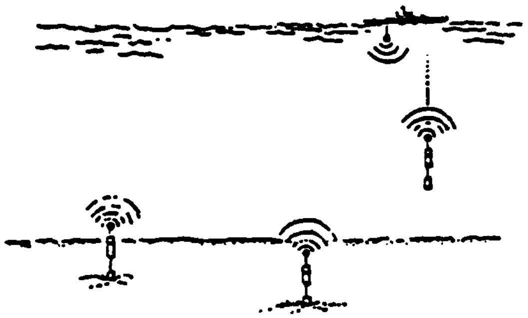
SCENARIO 3

Artist's view of implanted SEACON II structure.

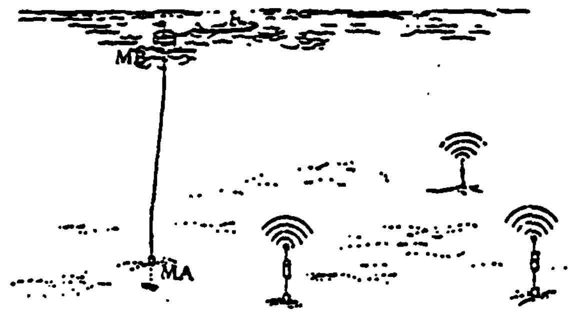


SCENARIO 3

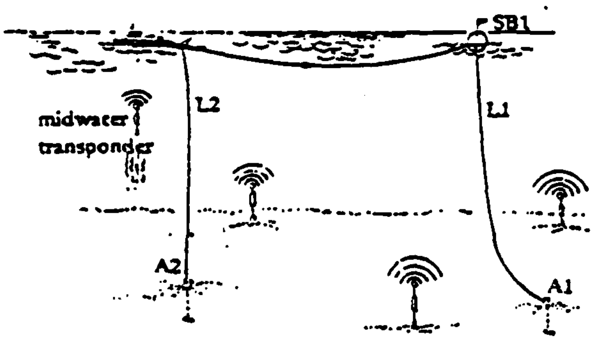
SEACON II Trimoor Structure and Associated Hardware



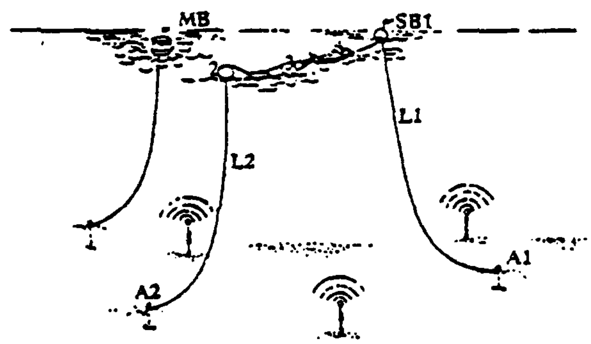
(a) Phase I — transponder installation and survey.



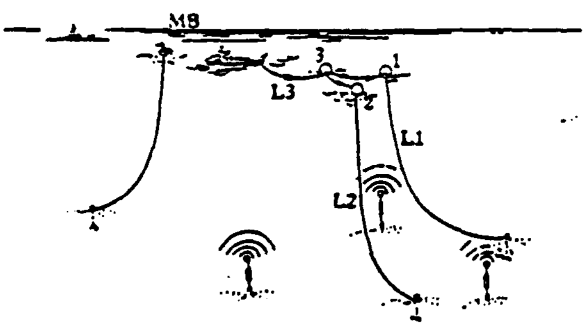
(b) Phase II — construction moor implant.



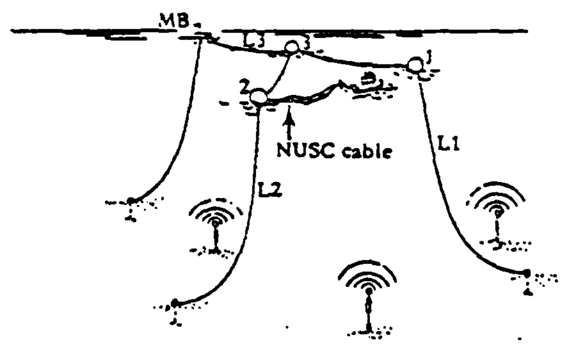
(c) Phase III — mooring leg L1 and L2 implant.



(d) Phase IV — EM delta installation.



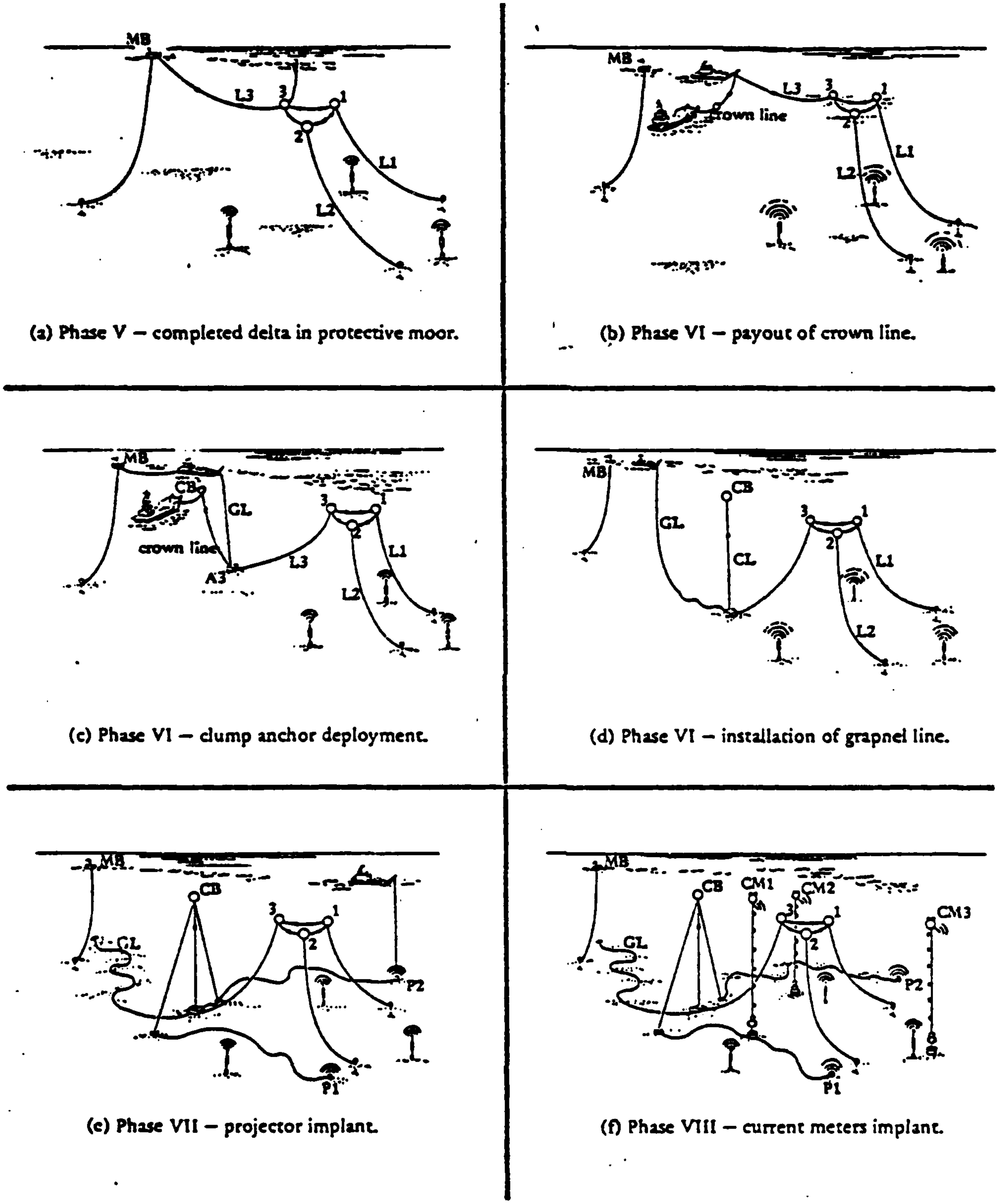
(e) Phase IV — payout of L3.



(f) Phase V — installation of NUSC cable in delta section.

SCENARIO 3

SEACON II installation sequence - Phases I through V.



(a) Phase V — completed delta in protective moor.

(b) Phase VI — payout of crown line.

(c) Phase VI — clump anchor deployment.

(d) Phase VI — installation of grapnel line.

(e) Phase VII — projector implant.

(f) Phase VIII — current meters implant.

Figure 5. SEACON II installation sequence — Phases V through VIII.

APPENDIX B

INSTALLED EQUIPMENT REQUIREMENTS

Owner's Requirements and Design Criteria

Installed Equipment Required

1 Machinery

a. Propulsion 8-10 knots/positioning power

- Existing (Add thrusters)
- Cycloidal
- Trainable nozzle or units (harbor master, etc.)

YR/YC 1000 hp min.

YFNB 2000 hp min.

b. Electrical Generation & Distribution

- 3 to 4 kw/man hotel load (max.)

  50 men - (2) 250 kw diesel generators
- 75 kw emergency

c. Piping & Pumping Systems

- Wash water } or same } hot & cold
- Potable water }
- Salt water/(flushing)/fire fighting/ballasting
- Bilge/contaminated oil/oily waste
- Sewage system/flushing
- Compressed air

d. Auxiliaries

- Water maker/waste heat/solo shell or capacity for

  30 days @50 gal/man-day (encl. wash flush)

  15 gal/man-day (potable only)

- HVAC

e. Deck

- 2 anchors/winch (cable-skagit) (6000' of 1¼" mooring cable each with 2500 lb lt weight anchors)
- Crane(s)/gantry/1 or 2 pedestal
- Stern roller/chute/shive or swivel fairleader
- 2 capstans on bow
- 2 air tuggers in work area
- A frames

2 Space Allocation (50 People)

a. Berthing/Messing/Rec-Lounge/Laundry

- Crew (26 - WQ & SB) @120 ft^2/man

  (0-8, C-4, E-5, D-2, H-7) (4 single 11 double)

- UCT up - to (1-0's Double 120 , Team - 12 Bunk room 360 , 2-CPO 4 man 140 - 620)

- USCG min requirements; 30 sq ft & 210 cu ft/man; 4 man max SR; bunks 30x76; 1-shower,1-toilet,1-washbase per ea 8

b. Offices/Shops/Labs/Lkrs

- Project/capt's office - 60 ft^2/ea.
- Mach/weld shops - 100 to 120 ft^2 ea.
- Photo/elex-elec lab - 50 ft^2 ea.
- Bos'n/scuba/DC - 50/100/25 ft^2

c. Ships' Stores

- Provisions/refer/freeze - 500 ft^2
- Misc. ships - 200 ft^2

d. Anti Roll Tanks

e. Fuel Tanks ~ 10,000 ft^3

f. Water Tanks

- W/o make up system 8 to 9,000 ft^3 and one fresh water system including flushing system
- W/make up system or use of potable and wash water systems 4,000 ft^3 - potable and make up or 4,000 wash water

3 Command & Control Equipment

a. Dynamic Positioning Elex Equipment Control (Auto Sation Keep)

b. Automatic Boat Positioning System

c. Acoustic Transponder Navigation System

d. Nav. & Comm. Equipment

- SSB transceiver (50 watts (2))
- UHF transciever (1-DC, 1-AC)
- Radar (56 mile)
- Loran "C"
- Satellite Navigation

- U/w log (2 axis)
- X-Y plotter
- Depth recorder (18,000 ft)
- U/w fathometer (3000')
- U/w comm. (Navy UQC)

e. Offline Plotter (to interface w/NAVFAC/FACSO, IBM 370)

f. Auto Positional Data Display & Plotting (interfacing EQ between various NAV & Position EQ)

g. Platform Position Indicating System (Honeywell RS-7 System or EQ)

APPENDIX C

ENVELOPE SIZE AND DESIGN

CRITERIA SUMMARY

Envelope Size of Dedicated Hulls

1. MR&S Summary of Design Size

   a. Hull statistics:

      LOA - 220' to 350'
      Beam - 40' to 70'   Beam : Length = 1:5 or 1:7
      Draft - 7' to 20'
      Deck area - 4,500 sq ft minimum topside
                  1,000 sq ft minimum enclosed
      Well size - 16'x32', to handle work platforms, Pisces or Sea Cliff minisub, etc.
      Displacement - 2,000 to 4,000 tons
      Low freeboard in working area - about 5'
      Cable storage volume - 15,000 ft^3 for 250 miles of 1¼" cable

   b. Propulsion:

      - Direct drive diesel or diesel electric.
      - Transit speed: 8 knots minimum
        Cable laying: 2 to 3 knots
        On station: 0 to 5 knots
      - SHP - 1,200 HP minimum
        3,600 HP maximum
      - Position keeping within 100' - Voith Schneider cycloidal propellers
      - Cycloidal propellers may be used in conjunction with existing propulsion system in areas of unexpectedly high currents.
      - Lift capacity (Paragraph 3.2.1-P.3) 50 L.T.
        Working depth (Paragraph 3.2.1-P.3) 16,000 ft.
        Anchoring Depth (Paragraph 3.2.3-P.3) 6,000 ft.
        Berthing Capacity (Paragraph 3.5.1-P.9) 50 People
        Endurance (Paragraph 3.5.7-P.9) 90 days fuel max
        30 days w/resupply
        Water (Paragraph 3.5.10-P.9) 50 gal/man-day

2. Other Sources (GFI, 1st Est by GMDI, etc.)

   a. UCT teams = 2 officers, 35 enlisted (mission and capabilities)

   b. From Scenarios

      - Maximum lift = 45-50 L.T. (Cable tank - cable trencher)

- Maximum cargo weight = 200 L.T.
  (Including special Ro-Ro winches)

- Minimum cargo volume
  8-10,000 ft^3 (1-2,000 ft^2)

- Minimum deck space
  3-5,000 ft^2 clear for deck cargo, work area and deck equipment

- Crew (from WQ&SB) = 26

- Passengers (GMDI est) UCT = 15

- Hotel area required (berth, etc)
  (26 x 120) + 620 (for UCT) = 3800 ft^2

- Other work/shop spaces (GMDI est)
  1,400 ft^2 (min) (list from Seacon)

- Fuel capacity = 250 L.T.

- Water capacity

  - 1 or 2 fresh water system
    w/o makeup capability = 250 L.T.
    (≈ 9,000 ft^3 = 67,000 gal)

  - w/ makeup capacity

    o 1 system ≈ 4,000 ft^3

    o 2 systems ≈ 3-4,000 ft^3
    each (only top off potable water sys upon departure ≈ 100 L.T.)

3. Power (1st est) Required (GMDI est from Seacon and other sources)

   a. With existing propulsion
   add 700 to 1,000 HP thrusters

   - Cyclodial = most \$, least eff, increase draft, very good D.P.
   - Thru hull rotable nozzle thrusters = med \$, best eff, may increase draft

   - Over side (harbor master type) = least \$, med eff, liftable, but increases beam.

   - Tunnel thrusters = low-med \$, best eff, not trainable, space available and hull shape fact-ors

b. Without existing propulsion

- through c. same
- Not applicable due to hull shape forward (YFNB)

4. GMDI Developed Envelope Figures

- Length - 200 to 300 ft
- Beam - 40 to 60 ft
- Cargo (including fuel & water) capacity 600 L.T. (min) UP
- Clear work deck area - 4,000 ft^2 (min)
- Cargo hold - 8,000 ft^3 (min)

5. Summary Design Criteria

- 30 days fuel and water endurance
- 4000 miles range
- Sea state 3 (H1/3; 4.9 ft @ 6 sec)
- Winds broadside 16 knots
- Current broadside up to 5 knots
- Lifting capacity 15-20 L.T. (normal)
- Lifting capacity 50 L.T. special purpose
- Cargo wt 200 L.T.
- Dynamic positioning accuracy 30' circle 6000 ft water depth
- Berthing for 50 personnel

APPENDIX D

COMMENTS ON CANDIDATE HULLS

COMMENTS ON HULL CANDIDATES

YC/YR

- 150 to 175 long
- Smallest considered
- Limited deck space/cargo volume and displacement
- Cannot accommodate centerwell
- Reduced berthing capacity
- Propulsion/positioning HP will be less
- Existing tankage not sufficient for mission must be constructed
- Basic rip out of hull and install
  - Berth/messing/hab spaces
  - Machinery
  - Tankage
  - Auxiliary
  - Cargo spaces and handling equipment
- May require additional barge/LCU to carry large volume cargo for some scenario (i.e. U/w tracking range)

ARS

- 214 long
- Smallest self propelled considered
- Limited deck/cargo volume and displacement
- Cannot accommodate center well
- Existing quarters must be re-done for merchant standards
- Propulsion satisfactory as exists and with diesel-electric power only thrusters with electric motors need to be installed
- Probably would require installation of 50 L.T. crane aft even though booms exist fwd and aft
- Sufficient propulsion power exists to tow small barge for large volume cargo (i.e. u/w tracking-ing range)
- Water making equipment installed
- Little or no auxiliary machinery required
- Range 8 to 10,000 miles at 12 1/2 knots
- Crew 32/scientists 25 (AGOR 18) ARGO
- Endurance 60 days (AGOR 17) CHAIN

YFNB

- 261 long
- Existing seacon lessons
  - Good hull/space/volume
  - Require additional power (~2000 HP)
  - Dual bridge control could be better
  - Additional water tankage needed
- Requires propulsion and positioning power
- Complete new living/habitability spaces
- Good deck/cargo areas available
- Space available for center well
- Requires auxiliary machinery/generators, pumps, etc.

C1-ME2-13a - 266 long

- Booklet (being sent)
- Bridge structure aft overlooking work deck (only one control space required)
- Existing accommodations for merchant standards - upgrade only
- Availability in question; two exist; T-AK 271 and AGOR-11 - both in service by MSC
- Space available for center well Use main deck as enclosed area or extend 01 LVL fwd for cover
- Tankage/space/hold/auxiliary machinery satisfactory as exists (probably)
- Require marine crane (50 L.T.)
- Possibility require mooring winch
- Good space and volume available
- Crew 40 scientists 19 Crew (AGOR 11);
  14-0 34-E (T-AK-271)
- Very strong hull
- Power available for thrusters (diesel-elec. prop.)

T1-MET-24a - 302' long

- Booklet (being sent)
- Bridge aft, structure overlooking work deck

* Similar to C1-ME2-13a except as below additional comments

- Require decks in cargo tank areas
- Cargo hatches required
- Helo deck installed aft
- 2 hull in MarAd reserve fleet (Current status in ? (Hold))

LST-1, 511; ARS Class

- 328' long
- Largest considered
- Very large work and cargo space available
- Very adaptable to gantry crane
- Space available for center well
- Enclosed work space/cargo hold provided in tank space
- Self propelled diesel-direct drive
- Thruster and power required
- Existing berthing is Navy. Will require extensive rework. Also extensive mods to superstructure above main deck.
- ARS also has extra deck house and repair machinery to remove
- High freeboard unless 2nd deck wing wall compartments were removed (expensive)
- Auxiliary machinery probably satisfactory

APPENDIX E

CONVERSION MODIFICATIONS AND CLASS F ESTIMATES

Conversion Modifications for Dedicated Hull

a. General Items

(1) All platforms are to be operated by civilian crew.

(2) Crew size to be about 10-bridge & deck personnel, 5-engineering, 4-7 support (cooks, storekeepers, etc.)

(3) Berthing to be 40 to 50 including 15 to 25 military personnel (enlisted may be berthed in bunk rooms).

(4) Even though U.S. Navy-owned, platforms will conform to USCG/ABS requirements or US Navy standards.

(5) All will require dynamic positioning.

(a) Approximately 1000 HP side thrust if self propelled.

(b) 1500 to 2000 HP ~~is~~ if cycloidal or harbor masters are used for prop & positioning.

(6) All to have mooring winch with approximately 6000 ft. cable capacity.

(7) List of offices/shop/lockers

(a) Operations office
(b) Captain's office
(c) Machine shop
(d) Welding shop
(e) Elec/Elex shop
(f) Photo lab
(g) Bos'n locker
(h) Scuba locker
(i) D.C. locker
(j) Laundry

b. LST/ARL

(1) Basic conversion same except ARL's have:

(a) Additional deck house (128 x 29) on main deck to be removed.

(b) Tank space full of machinery (lathes, etc.) to be removed.

(2) Reactivate ship

(a) Remove structure/equipment not to be used.

(b) Overhaul as required machinery to be retained.

(3) Install thrusters and power for same.

(4) Install anti roll tanks.

(5) Provide berth/messing facilities/lounge (Note: existing are U.S. Navy standard).

(6) Mooring winch with 3000' cable.

(7) Install two large (24x24) cargo hatches to tank area.

(8) Install gantry crane (10/50 tons) with tracks 150 ft. long and 2 A-frames (approximately 10T. ea).

(9) Provide center well about 20 x 30 with hatch cover and free flooding hinged outer doors. One-half well to be enclosed with roller curtain.

(10) Install bow shives or chute or fairleaders for cable handling (laying, retrieval, repair).

(11) Others IAW OCP (West) installed equipment required.

c. YFNB

(1) Remove structure/equipment not to be used.

c. YFNB

(2) Provide propulsion/positioning equipment and power for same.

(3) Install electrical generating and distribution system.

(4) Install berthing/messing/etc. spaces and equipment.

(5) Install piping and plumbing systems.

(6) Provide centerwell/outer doors/hatch cover - partially covered with roller certain.

(7) Gantry crane or marine pedestal crane(s).

(8) Large flush W.T. hatch (24 x 24) to cargo hold.

(9) Stern roller or chute.

(10) 1 Stern A-frame (approximately 25 T)/1-side (10 T).

(11) Mooring winch with approximately 3000 ft. cable.

(12) Anti-roll tanks.

(13) Others IAW OCP (West) installed equipment required.

d. YR/YC

(1) Remove structure/equipment not to be used.

(2) Provide propulsion/position equipment and power.

(3) Electrical gen. & distribution system.

(4) Berthing/messing/etc. spaces and equipment.

(5) Piping and plumbing systems.

(6) Gantry or 1 pedestal crane.

(7) 2 (8 x 8) flush W.T. hatches to cargo hold.

(8) Stern roller or chute.

(9) 2 (10 T) A-frames (one over stern).

(10) Mooring winch.

(11) Anti-roll tanks.

d. <u>YR/YC (Continued)</u>

(12) Others IAW OCP (West) installed equipment required.

e. <u>T1-MET-24a (C1-ME2-13a)</u>

(1) Reactivate ship

(a) Remove structure/equipment not to be used (minimal).

(b) Overhaul as required machinery to be retained (Note: C1-ME2-13a are active ships).

(2) Install thrusters (existing propulsion is diesel-electric).

(3) Install anti-roll tanks.

(4) Berthing/messing/etc. (existing merchant standard of 1950's).

(5) Large cargo hatch (24 x 24) to hold (Note: T1- has no hold deck in tank area - must be installed).

(6) Provide two pedestal cranes (1-50; 1-10T).

(7) Centerwell/outer doors/ hatch and enclosed area with roller curtain.

(8) Bow chute/shives/fairleaders.

(9) Mooring winch.

(10) Others IAW OCP (West) installed equipment required.

f. <u>ARS</u> (USS Clamp ABS-33)

(1) Reactivate ship

(a) Remove structure/equipment not to be used.

(b) Overhaul as required machinery to be retained.

(2) Install thrusters (existing propulsion is diesel-elec).

(3) Anti-roll tanks.

f. <u>ARS</u>

(4) Berth/mess/etc. (existing is Navy standard).

(5) Provide pedestal crane (50 T).

(6) Stern roller or chute.

(7) Mooring winch.

(8) Stern A-frame.

(9) Others IAW OCP (West) installed equipment required.

MADE BY

CHECKED BY

DATE 2-15-78

GLOBAL MARINE DEVELOPMENT INC.

ESTIMATE SHEET

TITLE NAVFAC. WEST COAST CONST.

W.O. No./A.F.E. No. 4072-010000

SHEETS ___ SHEET NO. ___

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
				$	
C.I.					7.0 M
YFNB.					7.5 M
YR/YC.					7.62 M
LST/AKL					10.12 M
ARS					5.6 M

CLASS F ESTIMATES

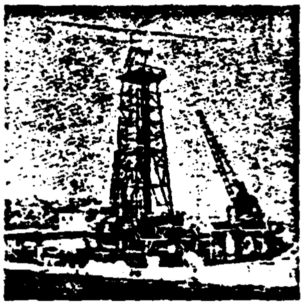
APPENDIX F

SMALL DRILLSHIP/BARGE

AVAILABILITY SUMMARY

Preliminary research on drill ships/barges of suitable size

From Ocean Industry, September 1977



C.G. Doris

ASTRAGALE

CONSTRUCTION: Renovated in 1967.

PERFORMANCE: Water depth—1,800'; Drilling depth—3,300'.

QUARTERS: 50 persons.

HULL: 197' x 42½'.

STORAGE: Mud & Cement Bulk—Active 226-bbl; Reserve mud—680 bbl; Fuel—600 bbl; Water for Drilling—2,600 bbl; Potable—1,080 bbl.

DRILLING EQUIPMENT: *Drawworks*—Nat'l. T 45-500 hp; Pumps—Nat'l. *G-700* 700-hp; Prime movers—2 MGO V12 ASHR, 550 hp.

DERRICK: 168'.

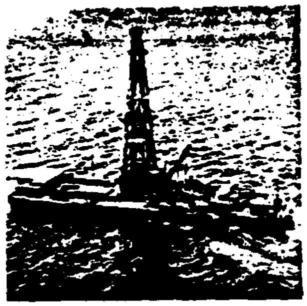
DIVING EQUIPMENT: C.G. Doris, 600', bell and decompression chamber.

REMARKS: Recently outfitted sophisticated instrumentation.

TOWING REQUIREMENTS: Self propelled.

CONTRACTED TO: *Petrobras.*

WORK AREA: Brazil.



Fluor Drilling Services, Inc.

DRILL BARGE I

CONSTRUCTION: Built by Todd Shipyard, 1958.

PERFORMANCE: Water depth—600'; Drilling depth—12,000'.

QUARTERS: 10 persons.

HULL: 252' x 68' x 17½' barge.

STORAGE: Mud & Cement Bulk—3,150 cf & 2,000 sks; Liquid mud—1,740 bbl; Fuel—1,835 bbl; Water for Drilling—7,820 bbl; Potable—1,800 bbl.

DRILLING EQUIPMENT: Drawworks—Nat'l 80 double drum; *Pumps—Gardner Denver* KXGA 1,000 hp, GD GXP 700 hp; Prime movers—4 Cummins V12T diesels.

DERRICK: 114'; 478-ton capacity.

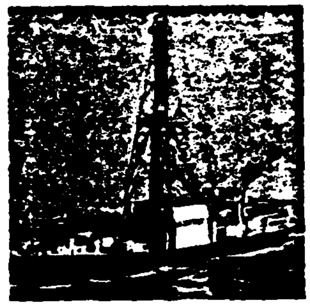
CRANES: One, Unit Model 1-271-W, 35-ton w/75' boom.

MOORING: *Four point system, four* 13,000-lb anchors and four 8,500-lb anchors w/1⅛" wire.

TOWING REQUIREMENTS: 2,500 hp or greater.

REMARKS: Formerly *WODECO I*, *Western Offshore I*

WORK AREA: Singapore.



Global Marine Inc.

GLOMAR II

CONSTRUCTION: Built by Equitable; 1962.

PERFORMANCE: Water depth—600'; Drilling depth—25,000'.

QUARTERS: 46 persons.

HULL: 268' x 58' x 16' draft.

STORAGE: Bulk mud—5,460 cf; Bulk Cement—2,940 cf; Liquid mud—2,170 bbl; Water for Drilling—10,466 bbl; Potable—1,212 bbl; Fuel—1,877 bbl.

DRILLING EQUIPMENT: Drawworks—Nat'l 1625 DE; Pumps—2 Nat'l G-1000; Prime movers—4 Cat D-398 diesel generators w/6 SCR units.

DERRICK: 138', 500-ton capacity.

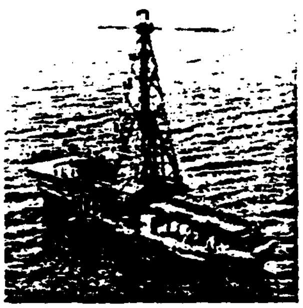
CRANES: Two Link Belt; one 40-ton and one 15-ton.

MOORING: Eight-point system; eight 1,500' chains, w/2½" wire line winches.

TOWING REQUIREMENTS: Self-propelled.

CONTRACTED TO: Texaco.

WORK AREA: Colombia.



Global Marine Inc.

GLOMAR V

CONSTRUCTION: Built by Equitable; 1963.

PERFORMANCE: Water depth—600'; Drilling depth—25,000'.

QUARTERS: 46 persons.

HULL: 268' x 58' x 15' draft.

STORAGE: Mud & Cement Bulk—5,880 cf; Cement—2,740 cf; Liquid Mud—2,180 bbl; Fuel—2,153 bbl; Water for Drilling—9,760 bbl; Potable—1,090 bbl.

DRILLING EQUIPMENT: *Drawworks—Nat'l* 1625 DE; Pumps—Two Nat'l G-1000-C; Prime *movers*—Cummins VT-12-GA-30.

DERRICK: 138', 500 tons.

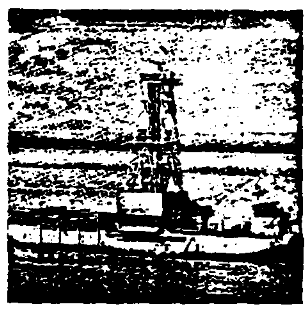
CRANES: Two Link *Belt, one 40-ton* and one 15-ton.

MOORING: *Eight-point pattern;* Eight 10,000-lb anchors, eight 20,000-lb anchors, eight *2½" mooring wire.*

TOWING REQUIREMENTS: Self-propelled.

CONTRACTED TO: Shell.

WORK AREA: Spain.



Global Marine Inc.

CUSS I

CONSTRUCTION: Converted Navy barge;

PERFORMANCE: Water depth—450'; Drill depth—15,000'.

QUARTERS: 50 persons.

HULL: 260' x 58' x 10' draft.

STORAGE: Mud & Cement Bulk—880 cf; Liquid—1,680 bbl; Bulk Cement—880 cf; Fuel—1,430 bbl; Water for Drilling—5,000 bbl; Potable—76 bbl.

DRILLING EQUIPMENT: Drawworks—Nat'l 110; Pumps—2 Nat'l G-700; Prime movers—4 Cummins VT-12 diesels.

DERRICK—142', 500-ton hook load capacity.

CRANES: Two Link Belt, rated 35,800 lb. w/25' boom; 124,300 lb. w/50' boom.

MOORING: Three 10,000-lb Danforth anchors; Four 8,000-lb Baldt Danforth anchors w/eight 1,500' chains.

TOWING REQUIREMENTS: Work boat assist.

CONTRACTED TO: Standard Oil of California.

WORK AREA: Southern California.

PHOTO
NOT
AVAILABLE

Progress Marine Inc.

EAST WIND

CONSTRUCTION: Phil Dockyard, Amelia, La.

PERFORMANCE: Water depth—400'; Drilling depth—30,000'.

HULL: 280' x 68' x 27'.

STORAGE: Mud & Cement Bulk—4,000 cf; Liquid mud—2,500 bbl; Fuel—4,420 bbl; Water for Drilling—16,000 bbl; Potable—350 bbl.

DRILLING EQUIPMENT: Drawworks—Nat'l 1320 UE; Pumps—Nat'l 10-P-130 1,300-hp triplex; Prime movers—4 PTD-88 Superior.

ROTARY TABLE: Nat'l C-375 37½" engines—Two, D-399 Caterpillar, GM 16V-71.

DERRICK: Dynamic, 154' x 38'; 1,333,000-lb.

CRANES: Two 50-ton Unit Mariner independent diesel.

MOORING: Four Skagit double drum winches; eight 20,000-lb anchors w/4,400' of 1¾" wire rope.

TOWING REQUIREMENTS: 4,500-hp tug; 6 K.

REMARKS: Lamb hydraulic piperacker.

CONTRACTED TO: Available.

WORK AREA: Morgan City, La.

Reading & Bates Offshore Drilling Co.

E.W. THORNTON

CONSTRUCTION: Built by Levingston Shipbuilding Co.; 1965.

PERFORMANCE: Water depth—400'; Drilling depth—25,000'.

QUARTERS: 86 persons.

HULL: 278' x 108' x 34'.

STORAGE: Mud & Cement Bulk—10,800 cf & 10,000 sks; Liquid mud—2,800 bbl; Fuel—5,200 bbl; Water for Drilling—12,800 bbl; Potable—1,640 bbl.

DRILLING EQUIPMENT: Drawworks—Oilwell E-3000; Pumps—2 Oilwell 1700-P, 1,750 hp ea. Prime movers—3 EMD 16-567-C, 2,000 hp ea.

DERRICK: 142'.

CRANES: Two Unit Mariner 15-tons @ 38'.

DIVING EQUIPMENT: Ocean Engineering.

MOORING: Eight-point system; 2¼" wire w/30,000-lb anchors.

TOWING REQUIREMENTS: Self propelled.

CONTRACTED TO: Mobil.

WORK AREA: Egypt.

Underwater Gas Developers Ltd.

TELESIS

CONSTRUCTION: Built by Davie Shipbuilding, converted by Underwater Gas Developers; 1974.

PERFORMANCE: Water depth—210'; Drilling depth—6,000'.

QUARTERS: 28 men.

HULL: 288' x 44' x 22'.

STORAGE: Mud & Cement Bulk—2,000 cf; Liquid mud—300 bbl; Fuel—16,000 gal; Water for Drilling—N/A; Potable—280 bbl.

DRILLING EQUIPMENT: Drawworks—Nat'l T-20, 380 hp; Pumps—C 250, C 150B; Prime movers—2, 650 hp each.

DERRICK: 101'; 460,000-lb hook load capacity.

CRANES: One American, 10 tons w/40' boom; One Pettibone, 15 tons w/60' boom.

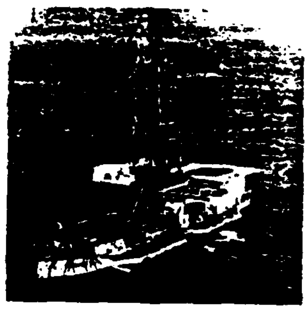
DIVING EQUIPMENT: Two-man decompression chamber.

MOORING: Five 1⅛" x 1,200' cable with ten 5,000-lb Danforth-type anchors.

TOWING REQUIREMENTS: 600 hp.

CONTRACTED TO: Consumers Gas Co.

WORK AREA: Great Lakes.



Zapata Corp.

INVESTIGATOR

CONSTRUCTION: Built by Australia State Dockyard, Newcastle; 1967 (converted).

PERFORMANCE: Water depth—450'; Drilling depth—18,000'.

QUARTERS: 50 persons.

HULL: 280' x 70' x 19'.

STORAGE: Mud & Cement Bulk—6,800 cf & 2,000 sks; Liquid mud—1,100 bbl; Fuel—1,800 bbl; Water for Drilling—4,500 bbl; Potable—600 bbl.

DRILLING EQUIPMENT: Drawworks—Ideco Hydair H-2500 double drum compound driven; Pumps—2 Ideco 1,450 hp; Prime movers—7 Caterpillar D-398 900-hp engines.

DERRICK: Lee C. Moore, 140'.

CRANES: One Unit Mariner, 25 tons @ 12'; one LeTourneau, 20 tons @ 40'.

DIVING EQUIPMENT: Oceaneering International.

MOORING: Eight 2,000' lengths 2⅛" chain; Eight 20,000-lb Danforth anchors.

TOWING REQUIREMENTS: 4,000 hp, 6 K.

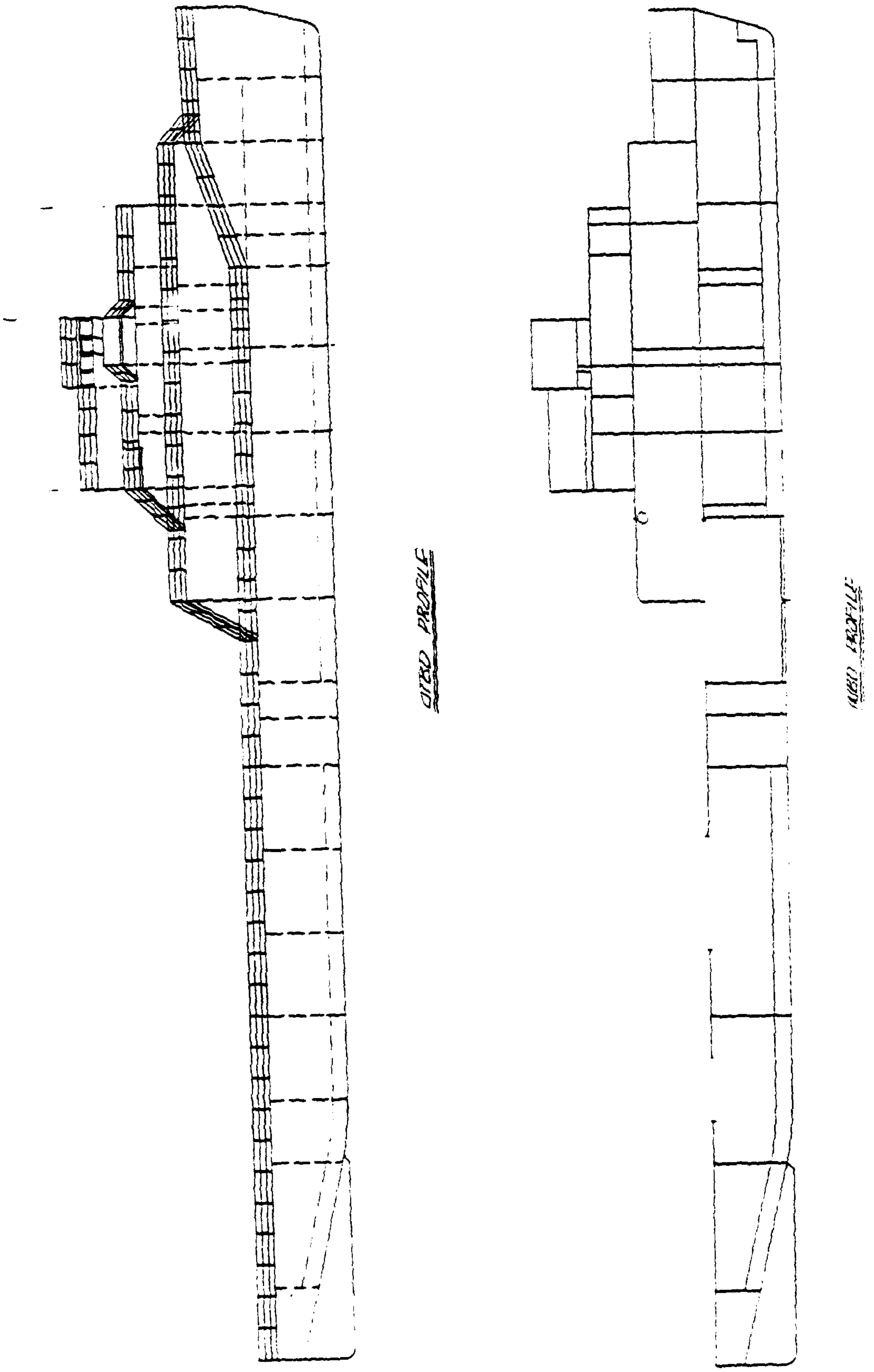
CONTRACTED TO: Available.

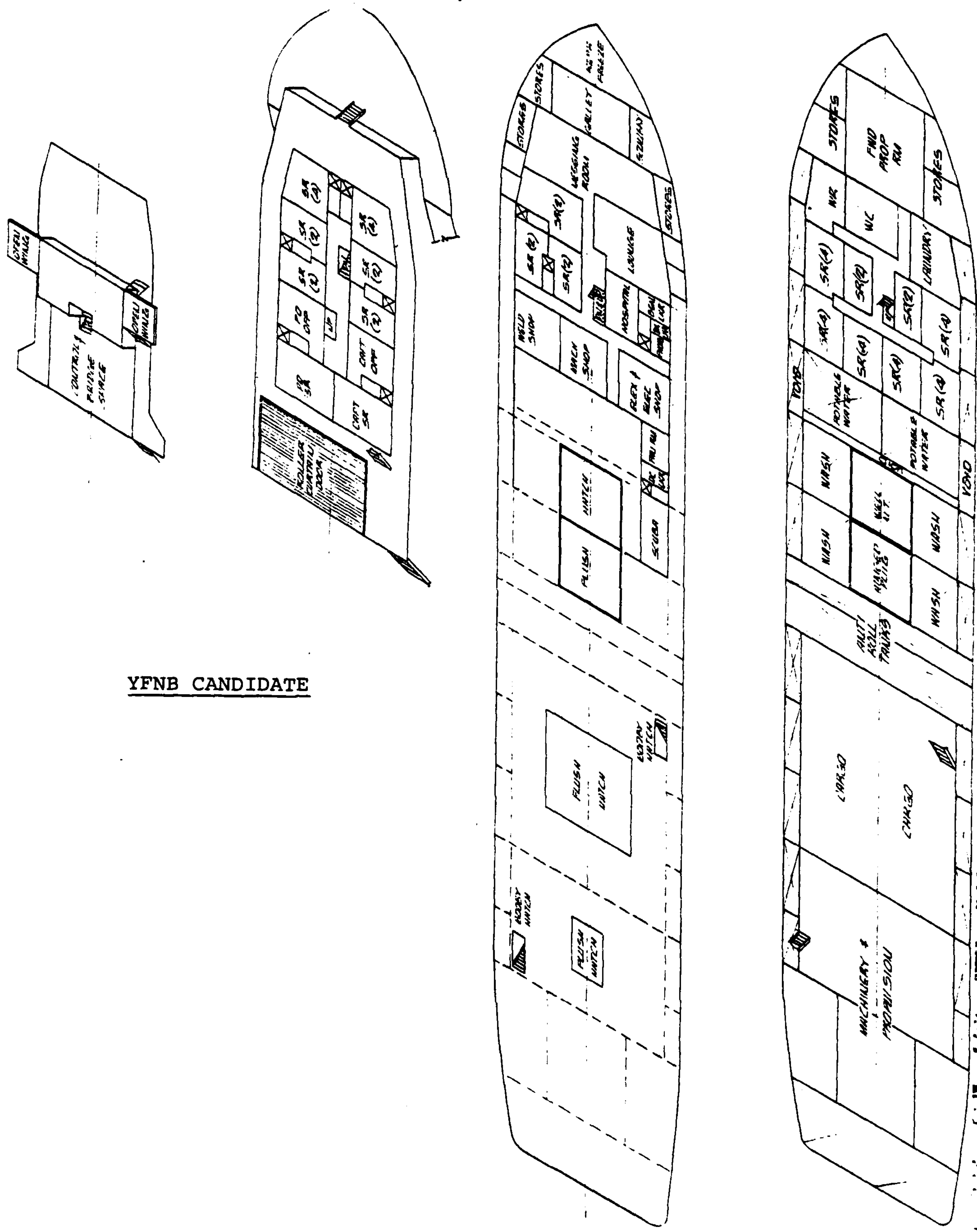
WORK AREA: Singapore.

APPENDIX G

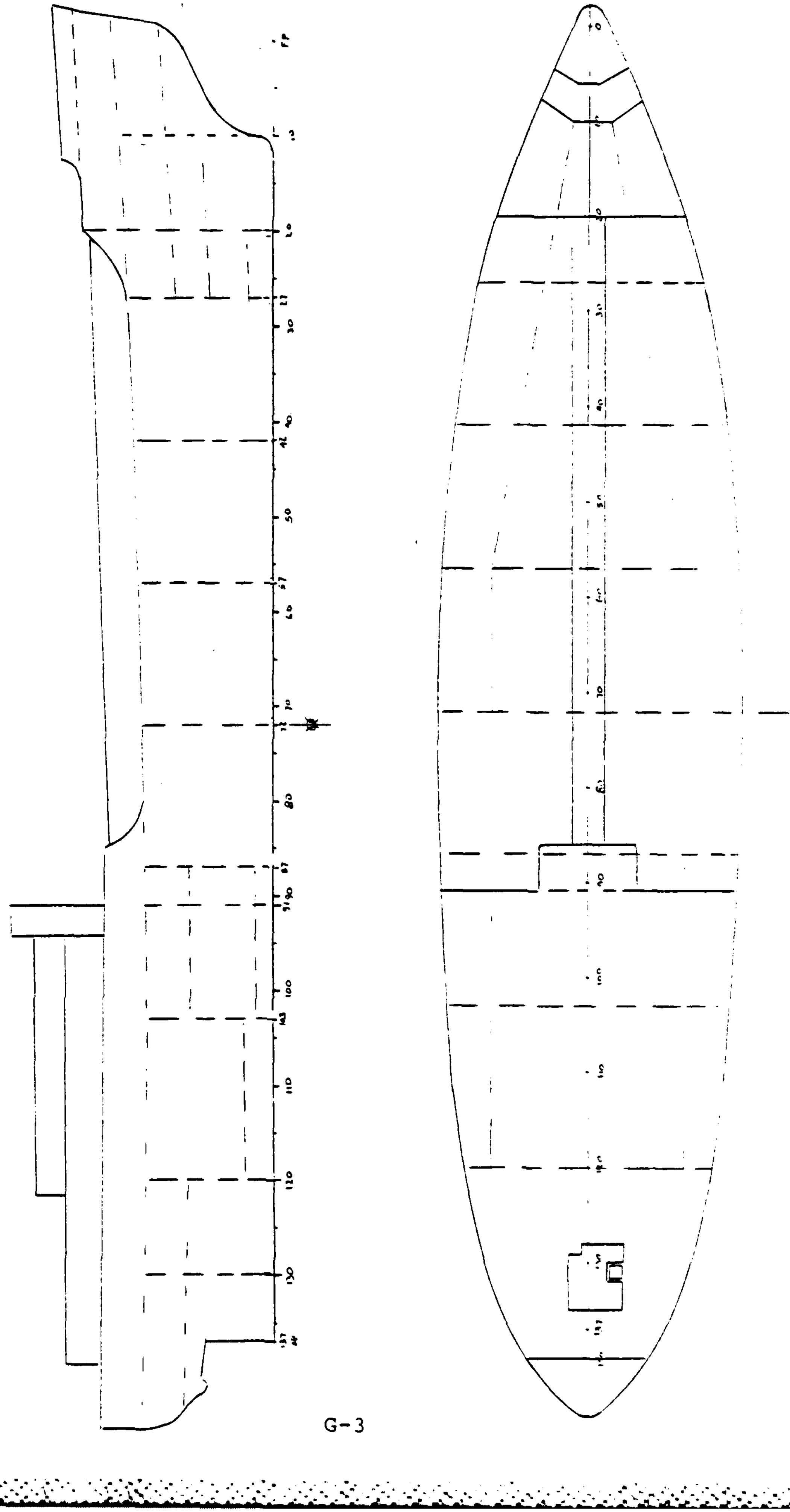
PRELIMINARY PROFILES AND
CLASS D ESTIMATES

YNFB CANDIDATE





YFNB CANDIDATE

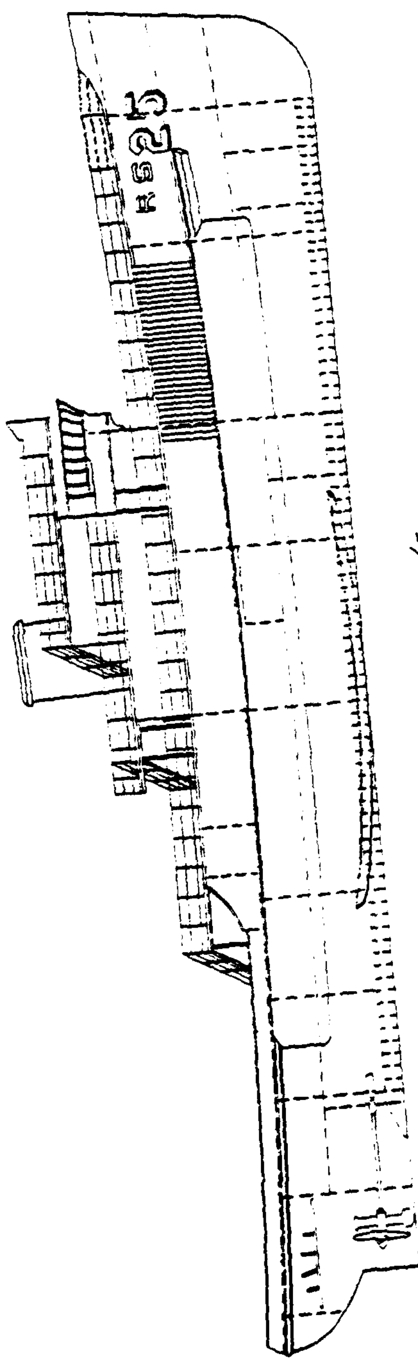


C1-ME2-13a

T1-MET-24a

CANDIDATE

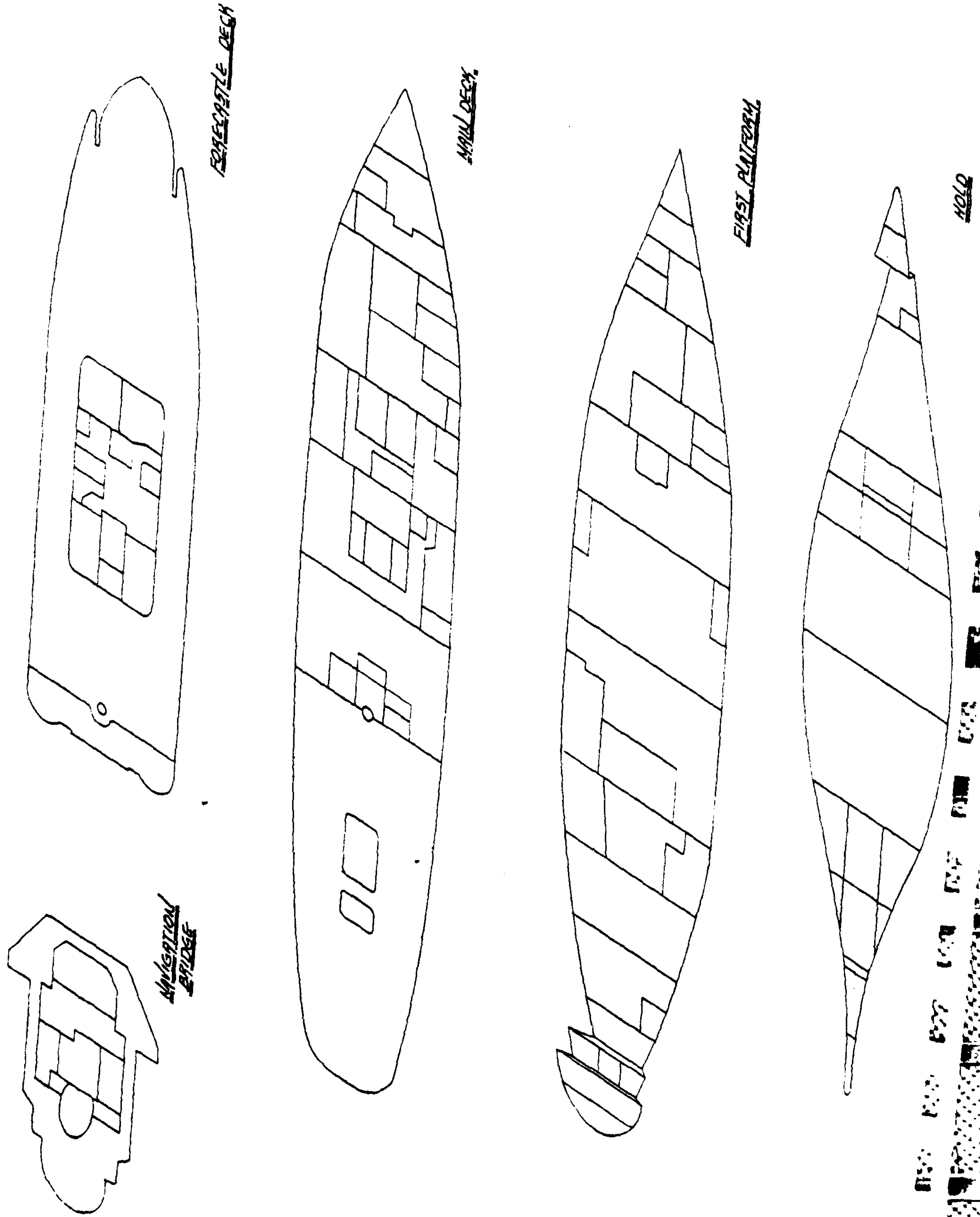
ARS CANDIDATE

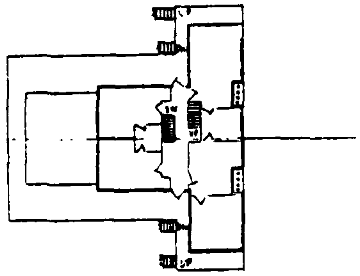


OTBD PROFILE

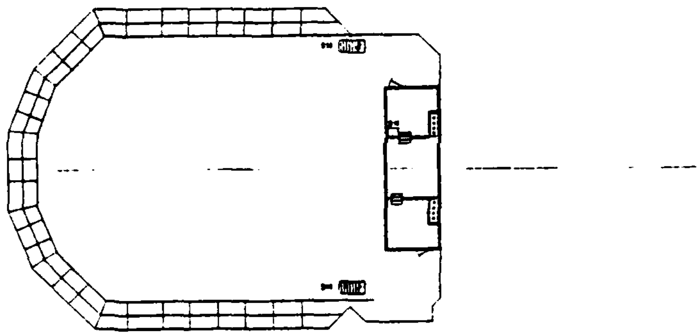
INBD PROFILE

ARS CANDIDATE

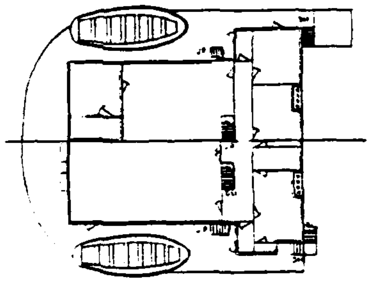




SUPERSTRUCTURE DECK

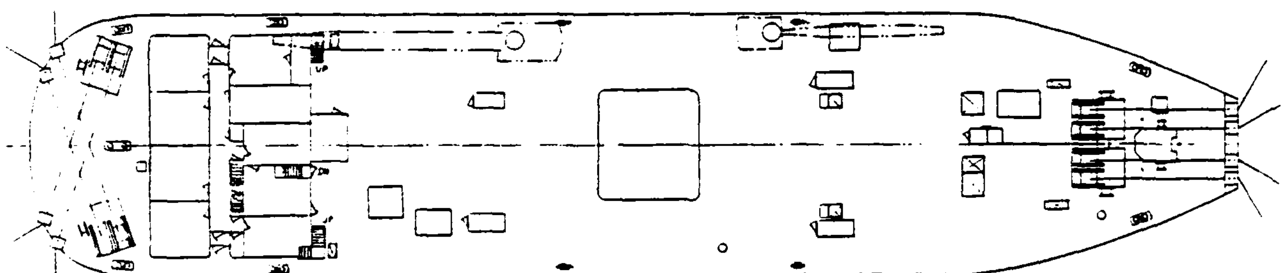


HELICOPTER DECK

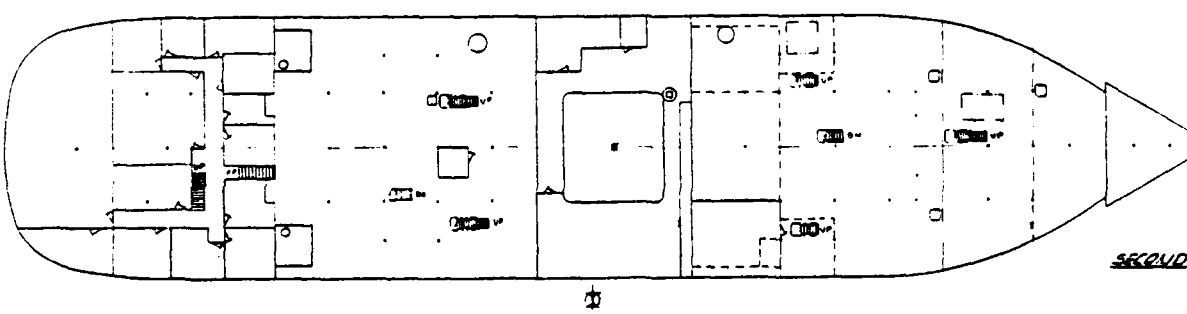


BOAT DECK

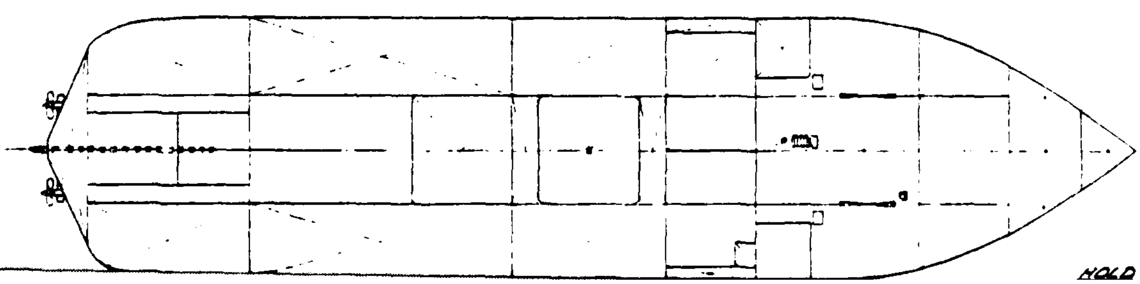
DRILLSHIP CANDIDATE



MAIN DECK

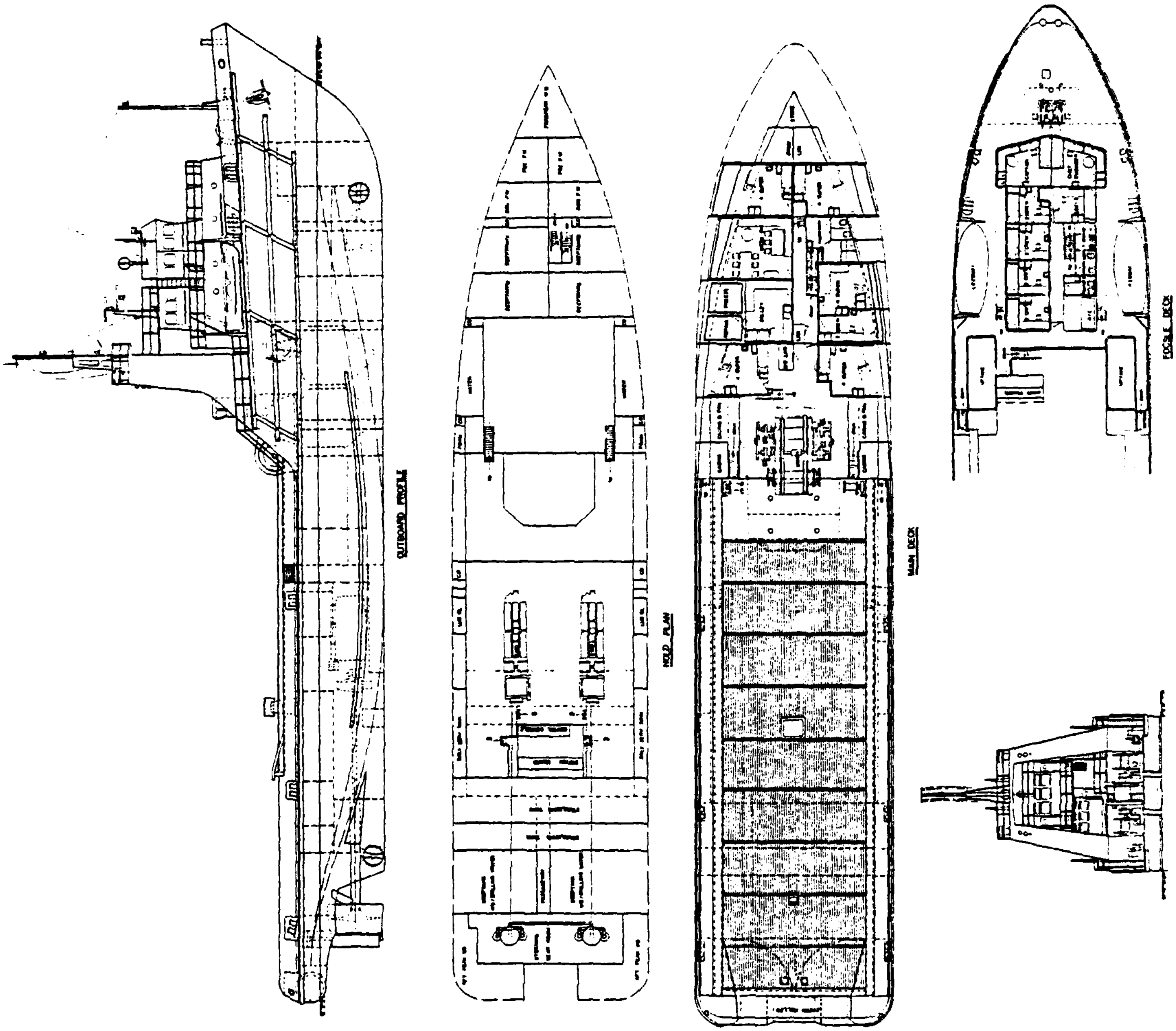


SECOND DECK



HOLD

218' OFFSHORE WORKBOAT CANDIDATE



4072-010000

MADE BY ________ **GLOBAL MARINE DEVELOPMENT INC.** W.O. No./A.F.E. No. ________

CHECKED BY ________ ESTIMATE SHEET SHEETS ____ SHEET NO. ____

DATE ________ TITLE NAV FAC WEST COAST CONST.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
				$		
YFNB					7.2 M	
C1-ME2-13a/T1-M2T-24a					5.75 M	
ARS					4.91 M	
DRILLSHIP CONVERSION				(4.32 +	1.8)	6.12 M
218' WORK BOAT (BUY)					8.5 M	

CLASS D
ESTIMATES

MADE BY Walker GLOBAL MARINE DEVELOPMENT INC. W.O. No./A.F.E. No. 04072-010000

CHECKED BY ESTIMATE SHEET SHEETS 3 SHEET NO. 1

DATE 2-24-78 TITLE NAVFAC YFN6.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
REMOVALS.				20,000	20000
DRYDOCKING	10 DAYS.		1500		15,000
CLEAN + PAINT HULL					40000
BERTHING SERVICES.	90 -		1500		135,000
ACCOMMODATIONS.	45 MEN.		30000		1350000
INCLUDES. STEEL BHDS, JOINER BHDS.					
FURNITURE + FURNISHINGS, SANITARY					
FIXTURES, VENT + A.C. DOORS,					
CONTROL SPACES, PIPING, DECK					
COVERING, LIGHTING, GALLEY.					
PURCHASE + INSTALL THRUSTERS	4	80	120K.	320	480,000
FDNS.	4	160	500	040	2000
PURCHASE 250KW DIESEL GENS	2		25K		50,000
INSTALL INCL FDNS.	2.	120		240	7000
10 KVA MOTOR GEN	1			64	5000
BALLAST PUMPS.	4				12000
FIRE PUMPS.	2		3000		6000
FO X'FER PUMP	1				2700
OILY WASTE SUMP PUMP.	1				1500
INSTALL PUMPS INCL FDNS	8	64	500	512	4000
L O PUMP				64	2500
SEWAGE PLANT.				1,000	20,000
AIR COMPRESSORS + RECEIVERS	3	64		192	75,000
MACHINE SHOP INCL. MACHINERY.					75000
PHOTO LAB.					50000
ROLLER CURTAIN.					150,000
HINGED PLUG IN WELL				2600	30000
FLUSH HATCHES				3,000	30,000
CUT OPENINGS FOR MOON POOL.				400	1,000
F + I MOON POOL BHDS, MISC BHDS ETC.	5 T	70/M.	500	7000	25000

MADE BY [signature] GLOBAL MARINE DEVELOPMENT INC. W.O. No./A.F.E. No. ______

CHECKED BY ______ ESTIMATE SHEET SHEETS 3 SHEET NO. 2

DATE 9-27-78 TITLE NAV FAC YFNB

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
50 TON GANTRY CRANE.					
PURCHASE.					420,000
INSTALL INCL RAILS. FDNS ETC.				2500	5,000
MISC. STORE ROOMS.				1,000	20,000
CLEAN + PAINT NEW +					
DISTURBED WORK				600	10,000
STERN ROLLER				800	15,000
ELECTRICAL POWER, CABLING ETC.				15,000	50,000
MAG COMPASS					2500
DEPTH RECORDERS	2				50,000
RADAR					20,000
P A SYSTEM					10,000
GYRO COMPASS					30,000
INTERCOM SYSTEM				400	15000
VHF DECCA					6500
SSB 150 RADIO					6000
LORAN					10000
RS-7 MASTER CONTROL DISPLAY					90,000
MISC.					10,000
LIFERAFTS. 25 MEN	4			160	15000
LIFEBUOYS.					500
LIFEBELTS.	50		16"		800
DISTRESS SIGNALS.					200
FIRE AXES, HOSES ETC.					10,000

MADE BY [signature] **GLOBAL MARINE DEVELOPMENT INC.** W.O. No./A.F.E. No. ______

CHECKED BY ______ **ESTIMATE SHEET** SHEETS 3 SHEET NO. 3

DATE 12-27-78 TITLE NAV FAC. YFN 6

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
BALLAST SYSTEM (1/3 GL. 40)	(5 TANKS)			5,700	38,000
VENTS & SOUNDS (GL 40)	"			3,000	25,000
POTABLE WATER (")	(2 TANKS)			766	5,528
SANITARY WATER (GL. 40)				846	11,000
ENGINE EXHAUST				600	5,000
DECK DRAINS				400	2,000
COMPRESSED AIR				1100	13,000
FUEL OIL				1600	24,000
LUBE OIL				200	7,000
FIRE MAIN				750	9,000
CO_2 SYSTEM				300	3000
VENTILATION				750	30,000
~~REEFER SYSTEM~~					
MISC DAY TANKS & PIPING SYSTEMS	8 TANKS			4,000	8000
INCLINED LADDERS					15,000
VERT " 12 x 15'	180'			180	1800
MANHOLES	16	32	60	512	960
RAILS & STANCHIONS. 3 TIER					
MAIN DK - EXISTING					
SUPERSTRUCTURE DECKS	600'	1.5		900	6000
				78096	
S.Y SERVICES 16%				12495	
				90591	358548
LAB 90591 x 25 -	2,264,775				
MAT	3,585,488				
+ HOLG. 15%.	537823				
SUB-TOTAL.	6,388,086				
S.Y. ENGR	300,000				
CHDI ENGR & CONST. S'VISION.	500,000				
	7,188,086				
	$7,200,000				

J. Kane

04022-010000

3 1

3-10-78

ESTIMATE SHEET

NAVFAC - TI-MET- 24a.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR HRS	MAT'L $
1/ REACTIVATE TI-MET, SEE ARS ESTIMATE FOR BASIS.	LOT			32,000	50,000
2/ DRYDOCKING	21 DAYS		1500	-	31,500
3/ BERTHING & SERVICES	60 DAYS			-	90,000
4/ CLEAN & PAINT HULL EXTERIOR (MLL)				-	60,000
5/ MODIFY & UPGRADE EXISTING QUARTERS TO ACCOMODATE MEN.				-	250,000
6/ THRUSTERS - 700 H.P. ELEC. DRIVEN	2.		$50,000		100,000
a) FAB. & INST. THRUSTER TUNNELS	2	1200	1500	2400	3,000
b) " " " " SHELL CASTGS	4	400	10,000	1600	40,000
c) " " " TRUNKS (VERT'L.)	2	500	750	1000	1500
d) " " " MOTOR FDN'S.	2.	120	750	240	1500
e) FAB. PATTERNS & MOCK-UP FOR THRUSTER INST'N.	LOT.	-	-	-	20,000
f) INSTALL THRUSTERS, THRUSTER MOTORS SHAFTING, ETC.	2	500	2000	1000	4,000
7) 50 TON PEDESTAL CRANE	ONE				175,000
a) FAB & INSTALL PEDESTAL				1500	5,000
b) INSTALL CRANE					
c) FAB & INSTALL, PIPING, ELEC'L, BOOM REST, ETC FOR CRANE				500	750
10 TON PEDESTAL CRANE	ONE				85,000
a) FAB & INSTALL PEDESTAL				1200	4,000
b) INSTALL CRANE.					
c) FAB & INSTALL. PIPING, ELEC'L, BOOM REST, ETC FOR CRANE.				500	750

J. Kan

04072-010000

3 2.

3-10-78

ESTIMATE SHEET

NAVFAC - TI- MET - 24a.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
9) FAB & INSTALL ANTI-ROLL TANKS (INCL STRUCTURAL, ETC.)				3000	60,000
10) FAB & INSTALL CARGO HATCH (24'-0" x 24'-0")				3,000	30,000
11) FAB & INSTALL CARGO DECK INCL. LADDERS, PLATFORMS, HANDRAILS, BOOBY HATCHES, ETC.				6,000	30,000
12) MOONPOOL: (16'-0" x 32" LG.)					
a) CUT OPENINGS FOR MOON POOL.				400	1,000
b) FAB & INSTALL MOON POOL BHD'S, MISC BHD'S	50T.	70/M	500	7,000	25,000
c) FAB & INSTALL MOON POOL HATCH WITH ROLLER CURTAIN, ETC.				3000	180,000
d) FAB & INSTALL HINGED PLUG IN WELL				2600	30,000
e) FAB & INSTALL LADDERS & HANDRAILS.				500	1,000
13) PURCHASE & INSTALL MOORING WINCH WITH FDNS, ETC.				300	60,000
14) FAB & INSTALL CABLE TROUGH, W/SHEAVES & FAIRLEADER IN BOW.				750	20,000
15) FAB & INSTALL ENCLOSED WORK AREA BETWEEN MOON POOL & AFT HOUSE.				2000	7,000
16) INSTALL SEWAGE TREATMENT SYS'M.				1,000	25,000
17) RE-FURBISH MACHINE SHOP.				200	10,000
18) INSTALL PHOTO LAB.					50,000
19) FAB & INSTALL 'A' FRAME.				1200	30,000

J Kane.

04022-010000.

3. 5.

3-10-78.

ESTIMATE SHEET

NAVFAC - TI-MET-24a

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
20) Misc. Store Rooms				500	10,000
21) Clean & Paint New & Disturbed Work Areas, Superstructure, Etc.				2,000	15000
22) Clean, Gas Free & Inspect Existing Tanks				500	2000
23) Re-Classification & A.B.S Certification				-	50,000
24) Test's & Trials.				-	100,000
25) Lifesaving Gear				160	26,500
26) Electrical for Thruster's & Controls				5,000	50,000
27) Dynamic Positioning System				1000	250,000
28) Strip Out Electronics Space				200	500
29) Remove Masts Etc.				1500	1,000
30) Misc & Contingency				8,375	30,000
Sub- Totals.				92,125	2,016,000
S/Y Services 16%				14,740	-
Total.				106,865	2,016,000

Lab 106,865 Hrs @ 25.00	= $2,671,625
Mat'l.	= 2,016,000
Handling 15%	= 302,400
Sub- Total	= 4,990,025
S/Y Eng'g	= 250,000
G.M.O.I Eng'g & Insp'n.	= 500,000
Total.	$5,740,025

Est'd Total Cost = $5,750,000

MADE BY Walker

GLOBAL MARINE DEVELOPMENT INC.

ESTIMATE SHEET

W.O. No./A.F.E. No. 04072 - 010000

CHECKED BY

SHEETS 2 SHEET NO. 1

DATE 2-28-78

TITLE NAVFAC - ARS

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
RE-ACTIVATE ARS I.E. PUT ALL MACHY ETC IN WORKING ORDER. LSD PER ADM SONENSHEIN 8000 MAN DAYS. SAY 50% FOR ARS. 4000 X 8 HRS. INCLUDING REQUIRED MODIFICATIONS).				32,000	50,000	
DRYDOCK (FOR HULL CLEANING + PAINTING + THRUSTER INSTALLATION)	21 DAYS		1500		31,500	
BERTHING SERVICES	60.				90,000	
CLEAN + PAINT HULL EXTERIOR.					40,000	
ACCOMMODATIONS. 50 PEOPLE EXISTING NAVY STANDARD. MODIFY TO COMMERCIAL ADD AIR CONDITIONING ETC.	50 PEOPLE		20,000		1,000,000	INCLUDES CONTROL HOUSE
STRIP OUT EXISTING ELECTRONIC SPACE.				200	500	
REMOVE MASTS ETC.				1,500	1,000	
PURCHASE 300 HP ELEC. DRIVEN THRUSTERS.	2			-	60,000	
INSTALL THRUSTERS, MOTORS ETC	2	500	2000	1000	4000	
FAB + INSTALL THRUSTER TUNNELS. INCL CUT SHELL OPENINGS ETC.	2	1000	1000	2000	2000	
THRUSTER TRUNKS. (VERT SHAFTING).	2	500	750	1000	1500	
THRUSTER TUNNEL (SHELL CASTINGS)	4	100	7000	400	28,000	
MOCK-UPS				-	20,000	
THRUSTER MOTOR FONS.	2	120	750	240	1500	
PURCHASE 50 TON CRANE					175,000	
INSTALL " " / FAB + INSTALL PEDESTAL				1500	5,000	
STERN ROLLER				800	15,000	
SEWAGE PLANT.				1000	25,000	
MACHINE SHOP (EXISTING)					25,000	
PHOTO LAB.					50,000	

MADE BY Walker GLOBAL MARINE DEVELOPMENT INC. W.O. No./A.F.E. No. 04072-010000

CHECKED BY ______ ESTIMATE SHEET SHEETS 2 SHEET NO. 2

DATE 2-28-78 TITLE NAVFAC - ARS.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
MISC STORE ROOMS.				500	10,000
CLEAN & PAINT NEW & DISTURBED WORK (EXISTING SUPERSTRUCTURE)				1000	20,000
ANTI-ROLL TANKS (STRUCTURAL MODS ETC)	2	1500	30000	3000	60,000
ELECTRICAL (CABLING ETC FOR THRUSTERS & CONTROLS). ELEC. CONTROLS				5,000	50,000
STERN 'A' FRAME.				1,200	30,000
MAGNETIC COMPASS THRU RS-7 MASTER CONTROL DISPLAY. SAME AS YFNB.				400	250,000
LIFESAVING GEAR - AS YFNB.				160	26,500
MOORING WINCH (PUR & INSTALL INCL FDNS)				300	60,000
MISC (POTABLE WATER TANKS, REFURBISH EXISTING EQUIP).				10,000	30,000
				63,200	
S.Y. SERVICES 16%				10,112	
				73,312	2,151,500

LAB 73,312 HRS × 25.00 =	1,832,800
MAT	2,151,500
+ HDLG 15%	322,725
SUB-TOTAL	4,307,325
S.Y. ENGINEERING	200,000
GMDI " + CONST. S'VISION	400,000
	$ 4,907,025
TOTAL EST COST.	$ 4,910,000

J. Kane

04072-010000

1.

3-13-78.

ESTIMATE SHEET

NAVFAC - GLOMAR V CONVERSION

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
1) DRYDOCKING.	21		1500	-	31,500
2) BERTHING & SERVICES.	60			-	90,000
4) HULL REPAIRS				-	100,000
5) CLEAN & PAINT HULL EXTERIOR (MLL)				-	60,000
6) REMOVALS: INCLUDES - DERRICK, CSG. RACK, RIG FLOOR, SUB-BASE PIPE RACKER & FDNS.; ALL DRILLING EQUIPT ON MAIN DECK AND ABOVE. ALL DRILLING EQUIPT., MUD & CEMENT SYSTEMS (INCLUDING PUMPS ETC.) BELOW MAIN DECK.				13,000	20,000
7) REMOVALS - POWER PLANT.				1,000	1,000
8) INSTALL NEW POWER PLANT				8,000	500,000
9) INSTALL TWO (2) 500 H.P. THRUSTERS (SAME AS TI-MET ESTIMATE MOD.)				5,000	150,000
10) MODIFY ACCOMODATIONS				1,000	50,000
11) CLEAN OUT TANKS (LIQUID MUD).	6.			600	600.
12) INSTALL HINGED PLUG.				2600	30,000
13) INSTALL PHOTO LAB				-	50,000
14) FAB & INSTALL CABLE TROUGH, ETC. (SAME AS TI-MET)				750	20,000
15) REMOVE ONE MOORING WINCH, W/FAIRLEAD ETC FORE & AFT.	(2)	500		1000	2000

J. Kane

04072-010000
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ESTIMATE SHEET

3-13-78. NAVFAC- GLOMAR V CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
16) FAB & INSTALL "A" FRAME				1200	30,000
17) INSTALL EQUIP'T IN MOON POOL STOREROOMS				1000	10,000
18) ELECTRICAL FOR THRUSTERS & CONTROLS				5000	50,000
19) DYNAMIC POSITIONING SYSTEM				1000	250,000
20) LIFESAVING GEAR.				160	26,500
21) CLEAN & PAINT NEW & DISTURBED WORK AREAS				2,000	15,000
22) RE-CLASSIFICATION & ABS CERTIFICATION				—	50,000
23) TESTS & TRIALS.				—	100,000
24) ADD'L PIPING SYSTEMS				1,000	25,000
25) MISC & CONTINGENCY (20% ON LAB.)				8,862	100,000
				53,172	1,761,600
Sup & Services				8,508	—
				61,680	1,761,600

LAB. 61,680 HRS @ 25.00/HR	=	1,542,000
MATERIAL	=	1,761,600
HANDLING 15%	=	264,240
		3,567,840
S/Y ENG'G	=	250,000
G.M.D.I. ENG'G & INSP'N	=	500,000
TOTAL	=	\$ 4,317,840
COST OF GLOMAR V	=	

SAY \$4,320,000

NAVFAC - SERVICE BOAT.

TACOMA BOAT - MODIFIED TO SUIT MARKED UP DWGS.

Est'd Cost 4th Quarter 1978.
$8,500,000
21 Months Del'y.

BASED ON 218' TIDEWATER MARINE WORKBOAT HULL MODIFIED AS FOLLOWS

- ADDITIONAL 500 HP THRUSTER AFT
- BERTHING FOR ADDITIONAL 18
- ONLY 1/2 INSTALLED SHP
- NO MUD/CEMENT TANKS

tacoma boat

TACOMA BOATBUILDING CO., INC. / 1840 Marine View Drive / Tacoma, Washington 98422 / Phone (206) 572-3600
Telex 32-7461
SHIPBUILDING / ENGINEERING / MACHINERY MANUFACTURE

April 21, 1978

Mr. John Kane
Global Marine Development, Inc.
P. O. Box 3010
Newport Beach, California 92663

Dear Mr. Kane:

Tacoma Boatbuilding Co., Inc. is pleased to offer the following budgetary estimate for the construction of a "Mamoth Tide" type 218 foot L.O.A. tug/supply vessel in accordance with discussions held between our engineering people and yourself.

Price - $8,500,000, subject to escalation.

Delivery - 18 - 21 months dependent upon time of award.

If further information is required, please do not hesitate to call on us.

Sincerely,

TACOMA BOATBUILDING CO., INC.

R Hill

Robert M. Hill
Vice President - Marketing

RMH:lt

APPENDIX H

DRAWING SCHEDULE AND

ARRANGEMENT DRAWINGS, FOR CONVERSION OF

YFNB AND DRILLSHIP

CATEGORY Arrangements/Electrical

PROJECT TITLE WCOCP

GLOBAL MARINE DEVELOPMENT INC.

PLAN SCHEDULE

SHT 1 OF 3

PLAN NO.	TITLE	REV	DATE	BY	JOB & TASK AUTHORIZATION	REF. DWG'S	ABS SUB.	ABS APP.	USCG SUB.	USCG APP.	REMARKS
D-4072-A001 3 Sheets	Commercial Hull Conversion	A	04/15/78								
D-4072-A002 2 Sheets	YFNB Hull Conversion	A	04/15/78								
D-4072-A003	YFNB Machinery Arrangements	A	04/24/78								
R-4072-E001	YFNB Electrical Distribution Layout	A	04/18/78								
D-4072-E002	YFNB Electrical Equipment	A	04/18/78								

CATEGORY Piping

PROJECT TITLE WCOCP

GLOBAL MARINE DEVELOPMENT INC.

PLAN SCHEDULE

SHT. 2 OF 3

PLAN NO.	TITLE	REV	DATE	BY	JOB & TASK AUTHORIZATION	REF. DWG'S	ABS SUB.	ABS APP.	USCG SUB.	USCG APP.	REMARKS
D-4072-P001	YFNB Saltwater Cooling System	A	04/20/78								
D-4072-P002	YFNB Firemain System	A	04/21/78								
D-4072-P003	YFNB Compressed Air System	A	04/24/78								
D-4072-P004	YFNB Plumbing and Drain System	A	04/21/78								
D-4072-P005	YFNB Wash Water & Potable Water Systems	A	04/21/78								
D-4072-P006	YFNB Sewage System	A	04/21/78								
D-4072-P007	YFNB Fuel Oil and Transfer Systems	A	04/24/78								
D-4072-P008	YFNB Ballast System	A	04/24/78								
D-4072-P009	YFNB Heating & Air Conditioning System	A	04/24/78								

NAVFAC (FPO-1) West Coast Ocean Construction Platform

CATEGORY Ventilation

PROJECT TITLE WCOCP

GLOBAL MARINE DEVELOPMENT INC.

PLAN SCHEDULE

SHT 3 OF 3

PLAN NO.	TITLE	REV	DATE	BY	JOB & TASK AUTHORIZATION	REF. DWG'S	ABS SUB.	ABS APP.	USCG SUB.	USCG APP.	REMARKS
D-4072-V001	YFNB Ventilation System	A	04/21/78								

ARRANGEMENT DRAWINGS

D.4072-A001	(3 sheets)	Commercial Hull Conversion
D.4072-A002	(2 sheets)	YFNB Hull Conversion
D.4072-A003		YFNB Machinery Arrangement

APPENDIX I

EX-DRILLSHIP LIGHTSHIP ESTIMATE; TRIM AND STABILITY SUMMARIES

WEIGHT REMOVALS

ESTIMATE OF WEIGHT FOR SHIPS, WORK SHEET
NAVSHIPS 9616A-2 (11-57)

DRILLSHIP CONVERSION

BUDGET BUREAU NO. 45-R281
REPORT-BUSHIPS-9291-4

DATE

DESCRIPTION	WEIGHT (Tons)	CENTER OF GRAVITY									
		ABOVE BASE	MOMENTS	REFERRED TO FRAME NO. 65				REFERRED TO			
				FWD	MOMENTS	AFT	MOMENTS	PORT	MOMENTS	STB'D	MOMENTS
SUBTOTAL SHEET 3	175.44		7091		7335						
SUBTOTAL SHEET 2	315.32		16511		3439						
TOTAL TO DEDUCT	490.76		23602		10774						
Lightship 6-11-69	2326.66		55119				- 8120				
Deduct	- 490.76		- 23602		- 10774						
New Lightship	1835.90	17.7	31517			10.29	- 18894				
TOTALS TONS											

COMPUTING BY

COMPUTING CHECKED

ESTIMATE OF WEIGHT FOR SHIPS, WORK SHEET
NAVSHIPS 9616A-2 (11-57)

WEIGHT REMOVALS

DRILLSHIP CONVERSION

BUDGET BUREAU NO. 46-R281
REPORT-BUSHIPS-9281-4

DATE

DESCRIPTION	WEIGHT (Tons)	CENTER OF GRAVITY ABOVE BASE	MOMENTS	REFERRED TO FRAME NO. 65 FWD	MOMENTS	AFT	MOMENTS	REFERRED TO PORT	MOMENTS	ST'BD	MOMENTS
136' Derrick	57.61	112.0	6452	5.0	288						
Crown Blk	4.04	180.0	727	5.0	20						
Drawworks (Nat'l 1675 DE)	36.32	46.0	1671	5.0	182						
Rotary Table (Nat'l C-375)	13.15	48.0	631	5.0	66						
Hook & Swivel (Nat'l 654HF 450T)	8.91	58.0	517	5.0	45						
Kelly (Drillco 40-ft)	1.12	46.0	52	5.0	6						
Kelly Spinner (Varco 6500)	0.72	46.0	33	5.0	4						
Heave Compensator (Vetco 200T 18')	14.25	64.0	912	5.0	71						
S. Shaker (Brandt Dual Tandem)	2.32	29.0	67	25.0	58						
Desander (Demco)	0.58	30.0	17	42.0	24						
Mud Mixers (Lighting)	0.58	28.0	16	29.0	17						
Desilters (Pioneer Siltmaster)	0.11	30.0	3	42.0	5						
Degasser (Swaco)	1.61	29.0	47	28.0	45						
Mud Pumps (Nat'l G-1000C Dupx) (2)	35.85	9.0	323	61.0	2187						
Mixing (Mission 6X8)	1.79	16.0	29	46.0	82						
BOP Control	5.74	28.0	161	5.0	29						
Riser Tensioner (GMI wts)	5.36	58.0	311	5.0	27						
Guideline (Vetco)	7.14	58.0	414	5.0	36						
Logging Unit (Schlumberger)	9.82	52.0	511			76.0	746				
Cementing Unit (Halliburton twin ht)	16.96	24.0	407	86.0	1459						
Casing Rack	58.04	38.0	2206			34.0	1973				
Centerwell Cart & Rails	7.63	27.0	206			12.0	92				
BOP Cart & Rails	13.50	27.0	365	5.0	68						
Moonpool Tuggers (3)	1.94	26.0	50	3.0	6						
TV Tuggers (2)	0.85	25.0	21	5.0	4						
TV Reel	0.67	25.0	17	5.0	3						
Hydro Unit for Tens & Heave Comp	5.36	46.0	247			14.0	75				
Active Tank	3.35	30.0	98	31	101						
SUBTOTAL	315.32		16511		3439						
TOTALS TONS											

COMPUTING BY

COMPUTING CHECKED

WEIGHT REMOVALS

ESTIMATE OF WEIGHT FOR SHIPS, WORK SHEET
NAVSHIPS 4610A-2 (11-57)

DRILLSHIP CONVERSION

BUDGET BUREAU NO. 45-R281
REPORT-BUSHIPS-8201-4

DATE

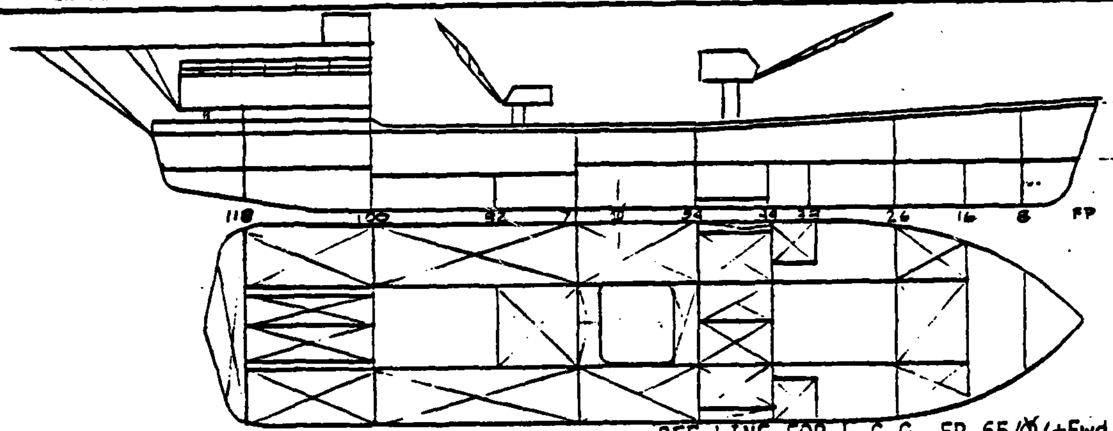
DESCRIPTION	WEIGHT (Tons)	ABOVE BASE	MOMENTS	CENTER OF GRAVITY REFERRED TO FRAME NO. 65 FWD	MOMENTS	AFT	MOMENTS	REFERRED TO PORT	MOMENTS	ST'BD	MOMENTS
Sub-base	69.64	38.0	2646	5.0	348						
Mud Logging Unit	6.70	35.0	235	33.0	221						
Diving Equip: Bottles (10)	0.16	29.0	5	58.0	8						
Compressor	1.52	29.0	44	68.0	103						
Mud Surge Tank (2)	0.39	30.0	12	69.0	27						
Cement Surge Tank	0.20	15.3	3	106.0	21						
Heave Comp & Tensioner Bottles (6)	8.57	32.0	274	27.0	231						
Bulk Mud Stowage (4)	2.23	14.0	31	66.0	147						
Bulk Cement Stowage (2)	1.03	15.3	16	106.0	109						
Pipe Racker	85.00	45.0	3825	72.0	6120						
SUBTOTAL	175.44		7091		7335						
TOTALS TONS											

COMPUTING BY

COMPUTING CHECKED

TRIM & STABILITY SUMMARY

CONDITION OF VESSEL Lightship	NO 1	DATE April 1978	PAGE 1
CARGO 0 % CONSUMABLES 0 % BALLAST 0 %		BY JCS	J/N 04072



REF LINE FOR V.C.G. Base Line

REF LINE FOR L.C.G. FR 65/Ø/+Fwd

SYMBOL	COMPARTMENT	CU FT TON	WEIGHT TONS	VCG ABV BL FT	MOMENT ABT BL FT TONS	LCG ABT Ø FT	MOMENT ABT Ø FT. TONS	VERT MOM OF F. S. FT. TONS
DEADWEIGHT								
LIGHT SHIP			1835.9	17.17	31517	- 10.29	- 18894	
DISPLACEMENT								

TRIM

DRAFT AT LCF	=	6.34 FT
MOMENT TO ALTER TRIM 1"	=	441.4 FT-LT
LCB (AFT, ~~FWD~~) OF Ø	=	.05 FT
LCG (AFT, ~~FWD~~) OF Ø	=	10.29 FT
TRIMMING LEVEL	=	10.24 FT
TRIM (BY STERN, ~~HEAD~~)	=	3.55 FT
LCF (AFT, ~~FWD~~) OF Ø	=	4.10 FT
DRAFT AT FP = 4.51 AP	=	8.06

DRAFTS AT DRAFT MARKS

MEAN 6.29

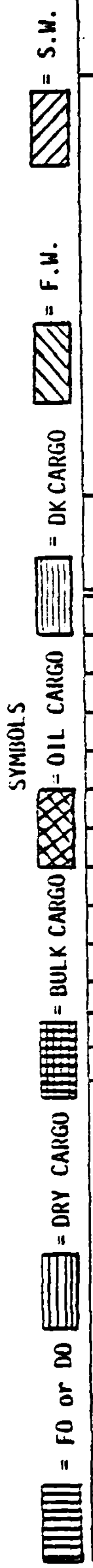
FWD = ______ AFT = ______

STABILITY

METACENTER ABOVE BL	$\overline{KM}$ =	51.46	FT
CENTER OF GRAVITY ABV BL	$\overline{KG}$ =	17.17	FT
METACENTRIC HEIGHT	$\overline{GM}$ =	34.29	FT
FREE SURFACE (F.S.)	=	-	FT
$\overline{GM}$ CORRECTED FOR (F.S.)	=	34.29	FT
$\overline{GM}$ REQUIRED	=		FT
MARGIN	=		FT
MOMENT TO HEEL 1°	=		FT-LT

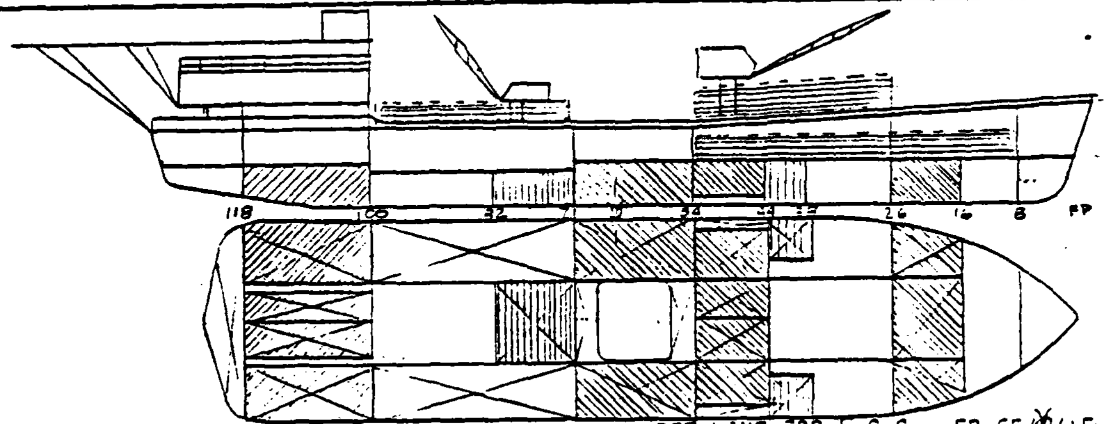
GLOBAL MARINE DEVELOPMENT INC.
KOLL CENTER NEWPORT
4100 MacArthur Boulevard
Newport Beach, California 92660

SYMBOLS
= S.W.
= F.W.
= OIL CARGO
= BULK CARGO
= DRY CARGO
= FO or DO



TRIM & STABILITY SUMMARY

CONDITION OF VESSEL Full Load	NO 2	DATE April 1978	PAGE 2
CARGO 100 % CONSUMABLES 100 %	BALLAST 65 %	BY JCS	J/N 04072



REF LINE FOR V.C.G. Base Line   REF LINE FOR L.C.G. FR 65/⊗/+Fwd

SYMBOL	COMPARTMENT	CU FT TON	WEIGHT TONS	VCG ABV BL FT	MOMENT ABT BL FT TONS	LCG ABT ⊗ FT	MOMENT ABT ⊗ FT. TONS	VERT MOM OF F. S. FT. TONS
	Crew & Effects		6	30	180	- 88	- 528	
	Stores & Provisions		45	22	990	- 106	- 4770	
	Deck Cargo (FR 26-54)		100	28	2800	50	5000	
	Cargo Hold (FR 8-54)		100	17	1700	68	6800	
	Dk Eq (FR 71-100)		50	28	1400	- 42	- 2100	
	FO		198		1161		745	
	Potable Water		167		1398		- 14460	
	Wash Water		378		3023		- 32530	
	Ballast (65%)		917		5779		35596	
DEADWEIGHT			1961		18431		- 6247	
LIGHT SHIP			1836		31517		- 18894	
DISPLACEMENT			3797	13.15	49948	- 6.62	- 25141	

TRIM

DRAFT AT LCF	= 11.90 FT
MOMENT TO ALTER TRIM 1"	= 519.7 FT-LT
LCB (AFT, ~~FWD~~) OF ⊗	= 3.30 FT
LCG (AFT, ~~FWD~~) OF ⊗	= 6.62 FT
TRIMMING LEVEL	= 3.32 FT
TRIM (BY STERN, ~~HEAD~~)	= 2.02 FT
LCF (AFT, ~~FWD~~) OF ⊗	= 7.60 FT
DRAFT AT FP = 10.83 AP	= 12.85

DRAFTS AT DRAFT MARKS

MEAN 11.84

FWD = ______ AFT = ______

STABILITY

METACENTER ABOVE BL	$\overline{KM}$ =	31.26 FT
CENTER OF GRAVITY ABV BL	$\overline{KG}$ =	13.15 FT
METACENTRIC HEIGHT	$\overline{GM}$ =	18.11 FT
FREE SURFACE (F.S.)	=	- FT
$\overline{GM}$ CORRECTED FOR (F.S.)	=	18.11 FT
$\overline{GM}$ REQUIRED	=	FT
MARGIN	=	FT
MOMENT TO HEEL 1°	=	FT-LT

GLOBAL MARINE DEVELOPMENT INC.
KOLL CENTER NEWPORT
4100 MacArthur Boulevard
Newport Beach, California 92660

ESTIMATE OF WEIGHT FOR SHIPS, WORK SHEET
NAVSHIPS 4618A-2 (11-67)

LIQUID LOADINGS

DRILLSHIP CONVERSION

BUDGET BUREAU NO. 46-R281
REPORT-BUSHIPS-8201-4

PAGE ____ DATE ____

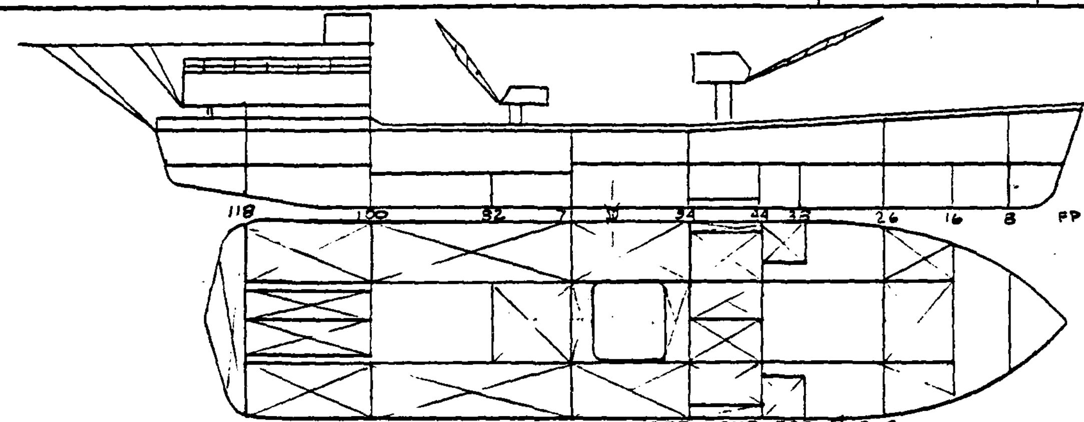
DESCRIPTION	WEIGHT (Tons)	ABOVE BASE	MOMENTS	CENTER OF GRAVITY, REFERRED TO FRAME NO. 65: FWD	MOMENTS	AFT	MOMENTS	REFERRED TO: PORT	MOMENTS	ST'BD	MOMENTS
Fuel Oil P/S 24246 gal 95%	78.11	6.5	508	48.0	3749.3						
Fuel Oil CL 35473 gal 95%	114.3	4.9	560			23.0	2629				
Day Tank 1818 gal	5.86	15.8	92.6			64.0	375				
TOTAL	198.27		1160.6		745.3						
Pot Water No 4 CL 2934 CF 100%	81.5	8.0	652			78.0	6357				
Pot Water No 5 CL 3071 CF 100%	85.3	8.75	746			95.0	8103				
TOTAL	166.8		1398				14460				
Lube Oil FR 95 P/S 2nd Dk	1.0	20.5	21			66.0	66				
Lube Oil FR 98 CL 2nd Dk	1.5	20.5	31			66.0	99				
Lube Oil FR 77½ P 2nd Dk	3.3	23.0	76			25.0	83				
TOTAL	5.8		128				248				
Ballast Tanks											
No 1 CL 5706 CF 100%	158.49	6.35	1006	88.0	13947						
No 1 P/S 4690 CF 100%	130.26	7.25	944	86.0	11294						
No 3 P/S 12992 CF 100%	360.90	6.24	2252	5.0	1805						
No 4 Inboard P/S 4320 CF 100%	123.2	5.9	727	32.0	3942						
No 4 Outboard P&S 5040 CF 100%	144.0	5.9	850	32.0	4608						
No 5 P/S 17888 CF 100%	496.88	5.10	1805			41.0	20372				
TOTAL	1413.73		7584		15224						
Wash Water Tk No 4 P/S 13602 CF 100%	377.82	8.0	3023			86.0	32530				
TOTALS, POUNDS											
TONS											

COMPUTING BY ____ COMPUTING CHECKED ____

TRIM & STABILITY SUMMARY

CONDITION OF VESSEL ______________________ NO ____ | DATE ________ | PAGE ________

CARGO ______ % CONSUMABLES ______ % BALLAST ______ % | BY ________ | J/N ________



REF LINE FOR V.C.G. ______________ REF LINE FOR L.C.G. ______________

SYMBOL	COMPARTMENT	CU FT TON	WEIGHT TONS	VCG ABV __ FT	MOMENT ABT __ FT TONS	LCG ABT __ FT	MOMENT ABT __ FT. TONS	VERT MOM OF F. S. FT. TONS
DEADWEIGHT								
LIGHT SHIP								
DISPLACEMENT								

TRIM

DRAFT AT LCF = ________ FT

MOMENT TO ALTER TRIM 1" = ________ FT-LT

LCB (AFT, FWD) OF __ = ________ FT

LCG (AFT, FWD) OF __ = ________ FT

TRIMMING LEVEL = ________ FT

TRIM (BY STERN, HEAD) = ________ FT

LCF (AFT, FWD) OF __ = ________ FT

DRAFT AT FP = ________ AP = ________

DRAFTS AT DRAFT MARKS

MEAN ________

STABILITY

METACENTER ABOVE BL $\overline{KM}$ = ________ FT

CENTER OF GRAVITY ABV BL $\overline{KG}$ = ________ FT

METACENTRIC HEIGHT $\overline{GM}$ = ________ FT

FREE SURFACE (F.S.) = ________ FT

$\overline{GM}$ CORRECTED FOR (F.S.) = ________ FT

$\overline{GM}$ REQUIRED = ________ FT

MARGIN = ________ FT

MOMENT TO HEEL 1° = ________ FT-LT

GLOBAL MARINE DEVELOPMENT INC.

KOLL CENTER NEWPORT

SYMBOLS

- = FO or DO
- = DRY CARGO
- = BULK CARGO
- = OIL CARGO
- =
- = F.W.
- = S.W.

APPENDIX J

EX-DRILLSHIP DYNAMIC MOTION AND RAO CURVES;

BRETCHNEIDER'S SEA SPECTRUM DATA

FROM YOUSEF ALINAGHIAN 5/6/78

SHIP MOTION RESPONSE FOR YFNB AND GLOMAR V CONVERSION

JOB NO. 04072 -010000

COMPUTER JOB NO. *016*YA 4072X10000

TOTAL MAN HRS : 41 hrs

TOTAL COMPUTER CHARGE : $470.

RESULTS FROM HANSEL PROGRAM ARE INPUT INTO SPECTR PROGRAM (SEE APPENDIX FOR MORE DETAIL).

RAO RESULT FROM HANSEL AND MOTION RESULTS FROM SCETEC ARE PLOTTED USING COMPUTER PROGRAM PMC.

APPENDIX

Bretchneider's spectrum has been used for the spectral analysis. The spectrum has the following form:

$$Ss(\omega) = \frac{262.5\ hs^2}{\omega^5 Ts^4} \quad e^{\left(-\frac{1050}{Ts^4\omega^4}\right)} \qquad (1/2\ AMPL^2)$$

where Ss = sea spectrum density

ω = wave circular frequency

Ts = significant wave period, seconds

Hs = significant wave height, feet ($Hs = .222T^2$)

The following sea states are input into the SPECTR program. Note: Ts is calculated using:

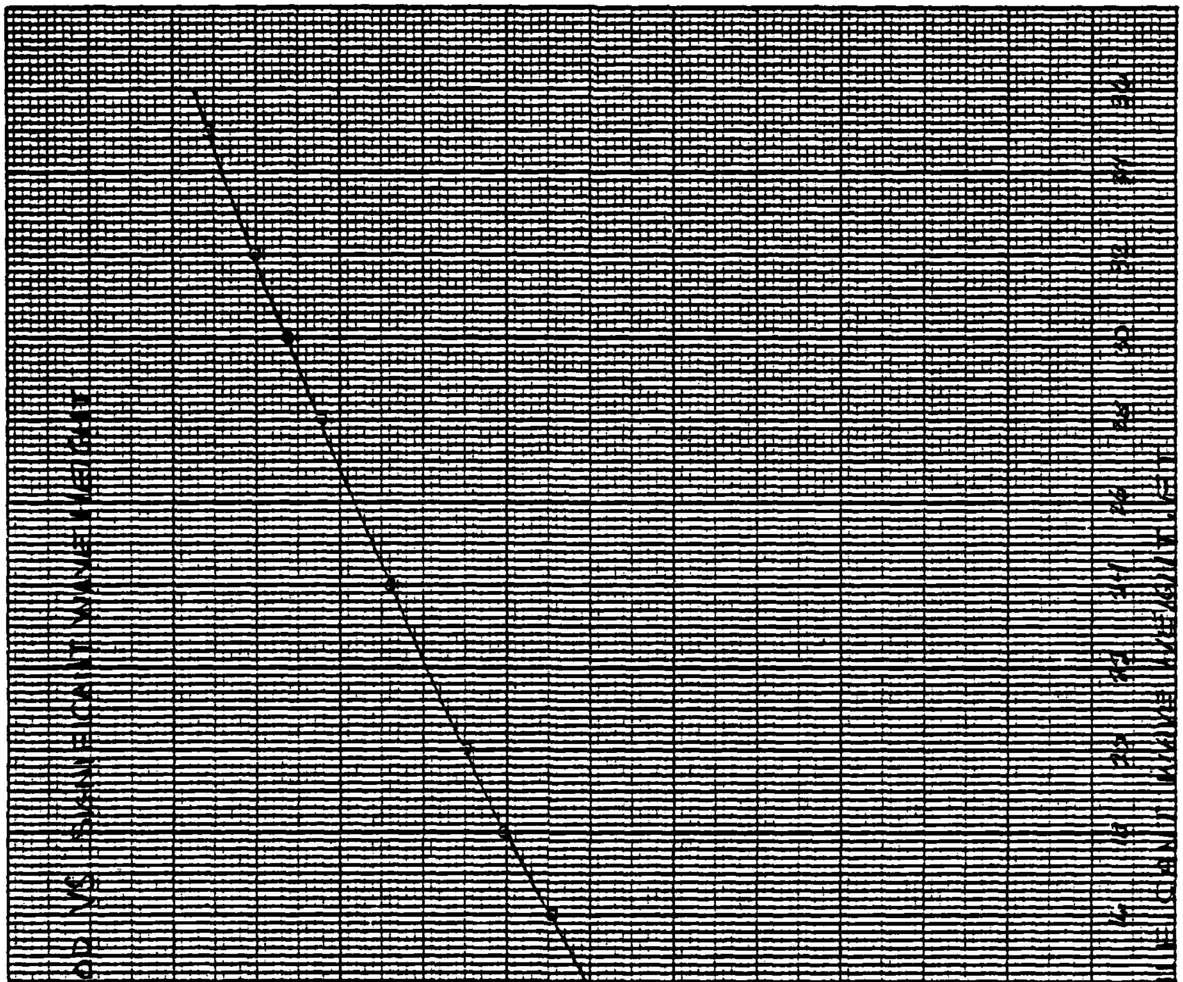
$$Ts = \left(\frac{Hs}{.222}\right)^{1/2}$$

(See next page for the plot of Ts vs. Hs)

Hs (FT)	Ts (SEC)
4	4.23
6	5.20
8	6.00
10	6.71
12	7.35
14	7.94
16	8.49
18	9.01
20	9.49
24	10.40
28	11.23
30	11.63
32	12.01
35	12.57

K·E 20 X 20 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 1242



PART 2

SHIP MOTION ANALYSIS FOR GLOMAR V CONVERSION:

THE FOLLOWING DATA ARE INPUT INTO HANSEL PROGRAM:

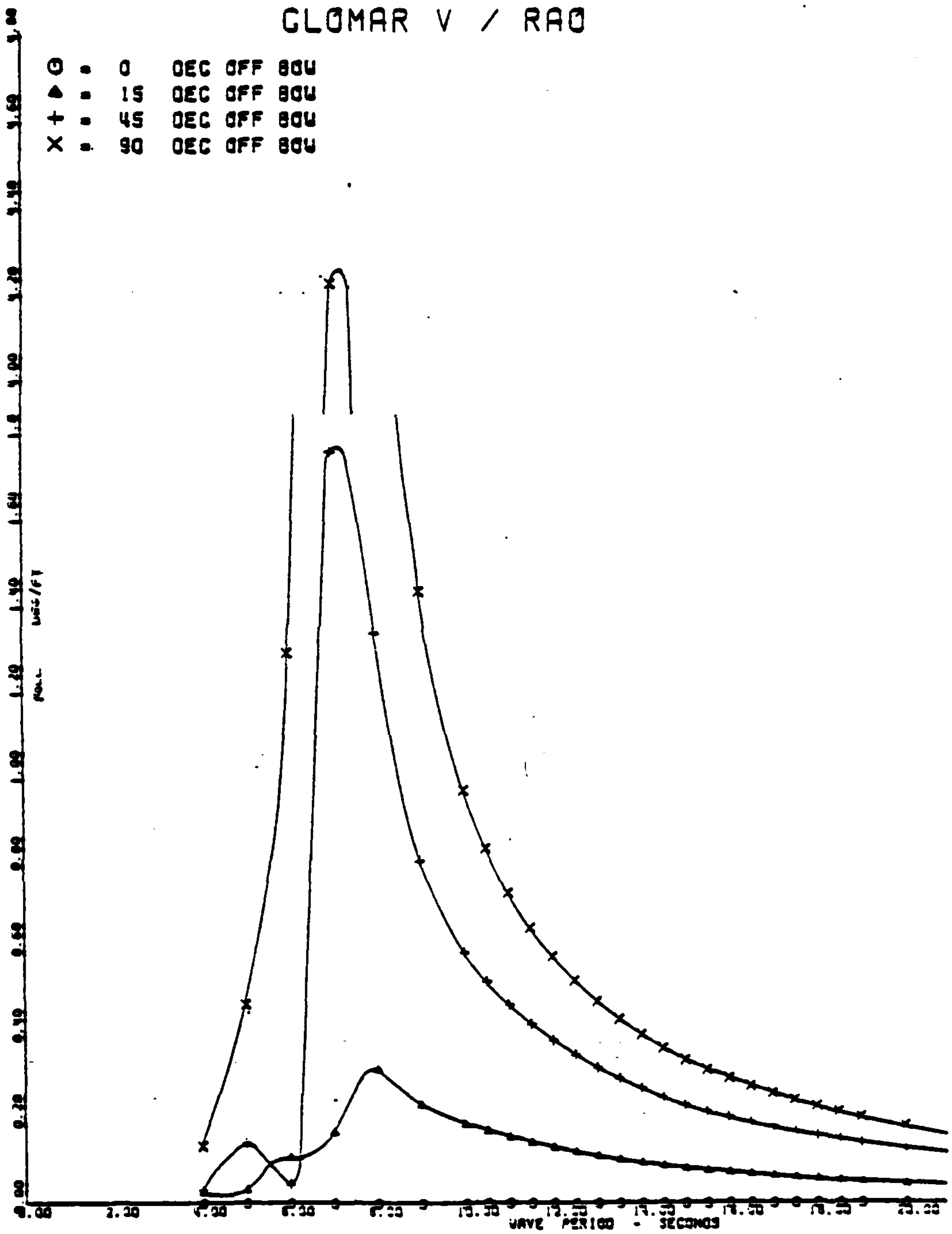
L_{BP} = 260 FT
BEAM = 58 FT
DRAFT = 14 FT
ROLL RADIUS OF GYRATION = 20.80 FT
PITCH " " " = 66.44 FT
YAW " " " = 71.20 FT
VCG = 14 FT ABOVE BASE LINE

THE FOLLOWING DATA IS CALCULATED BY THE PROGRAM

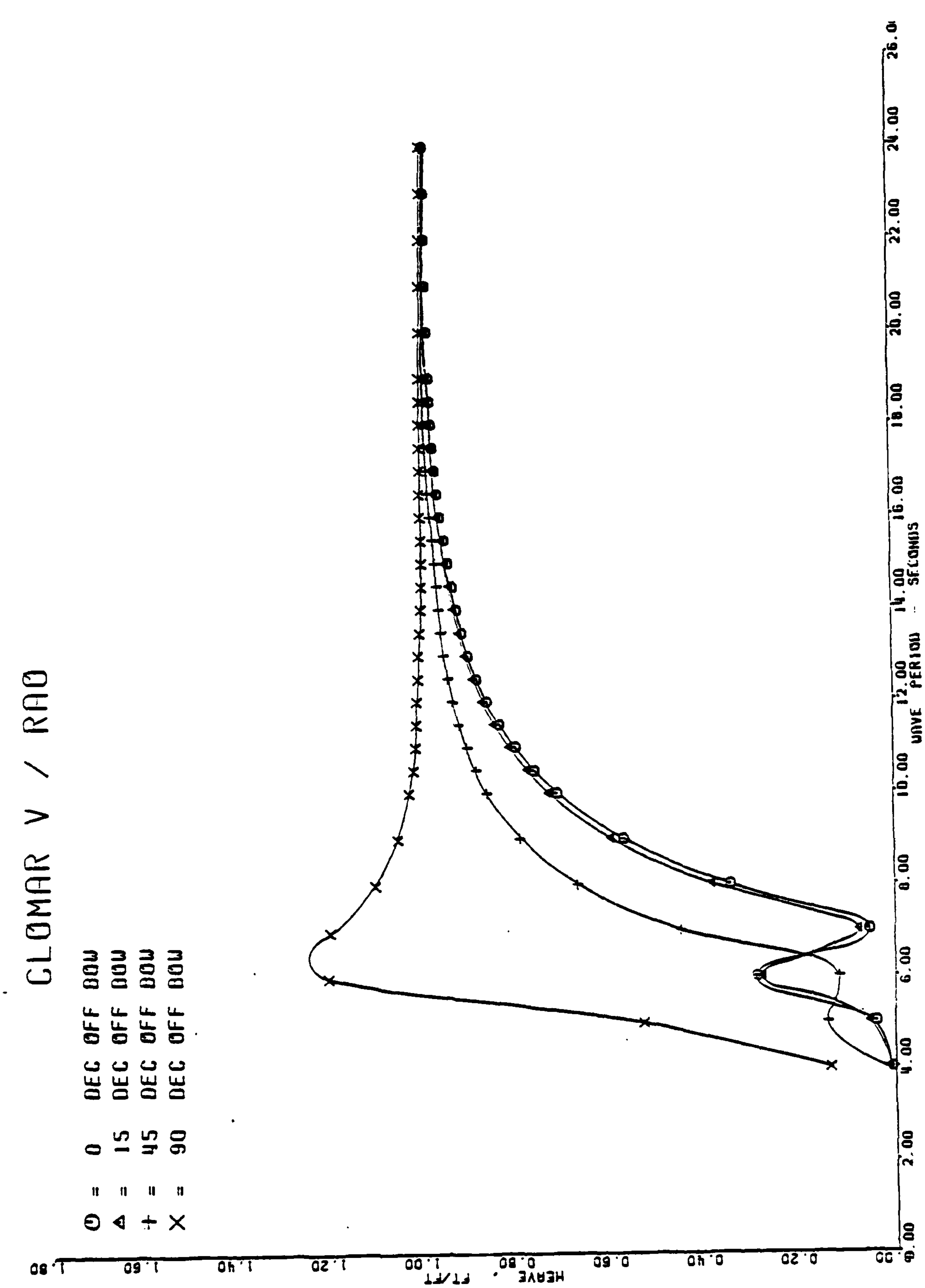
DISPLACEMENT = 4745 TONS
$\overline{KM}$ = 28.05 FT
$\overline{GM}$ = 14.05 FT

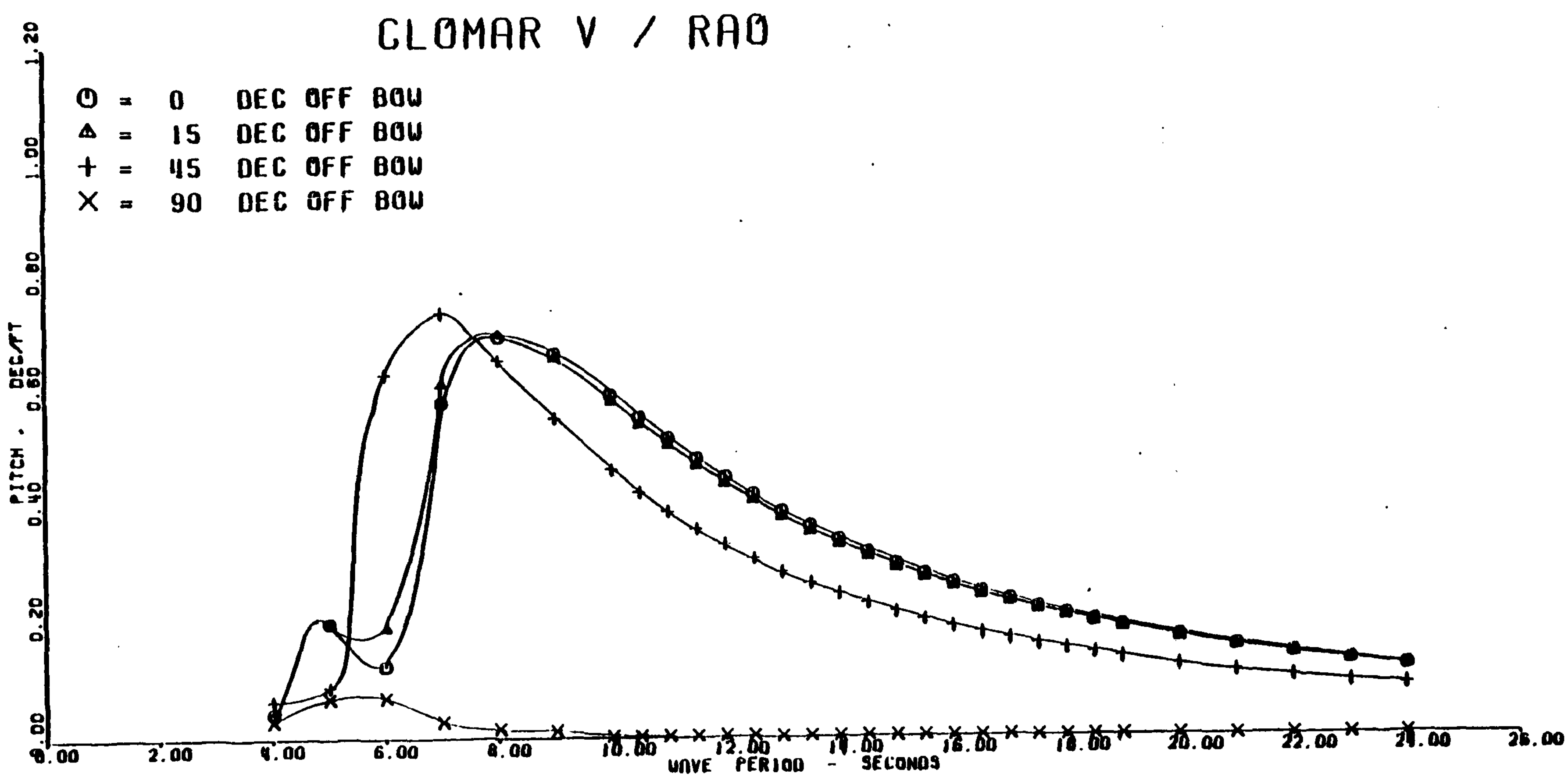
FROM TRIM AND STABILITY:

DISPLACEMENT = 4050 TONS

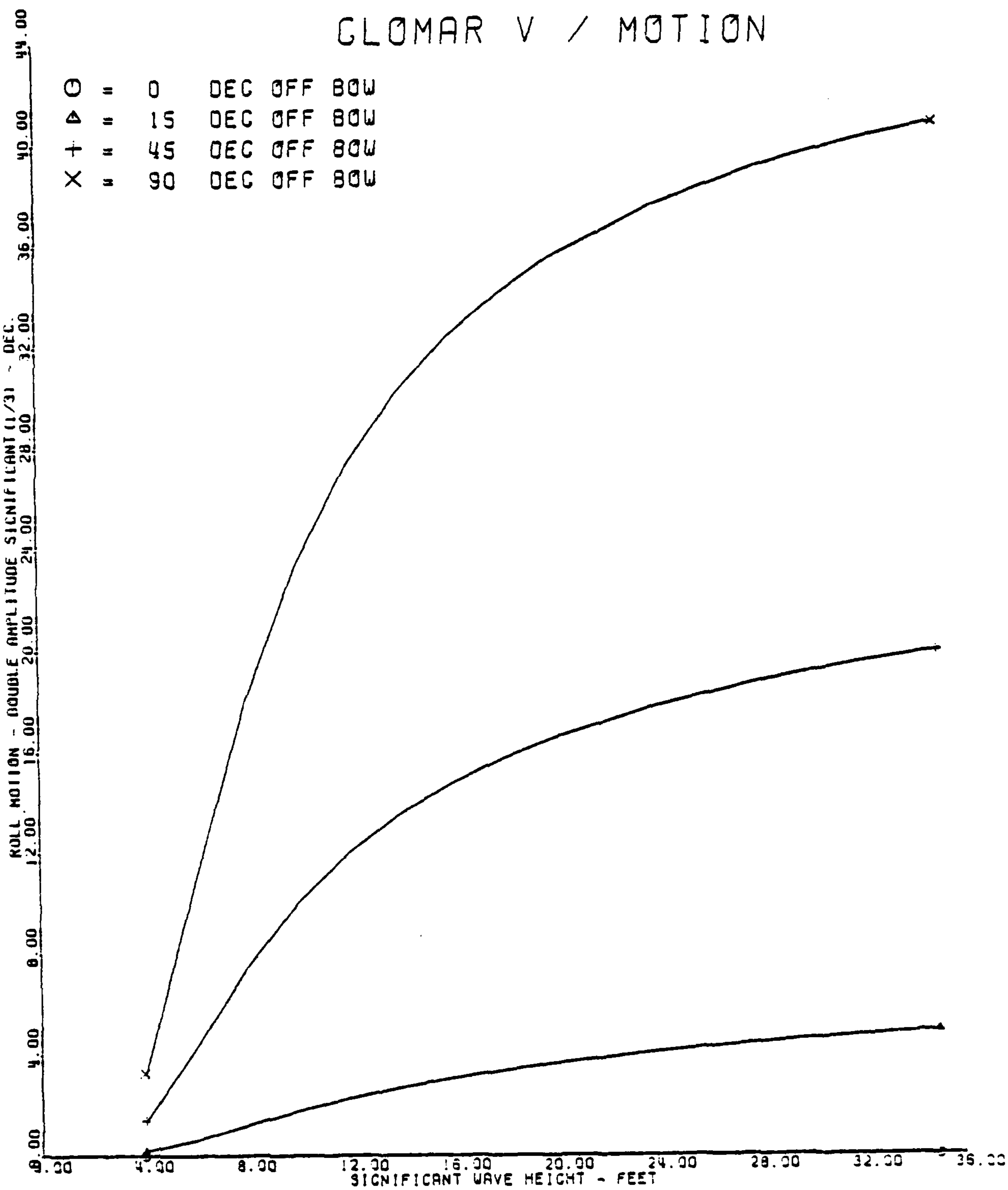


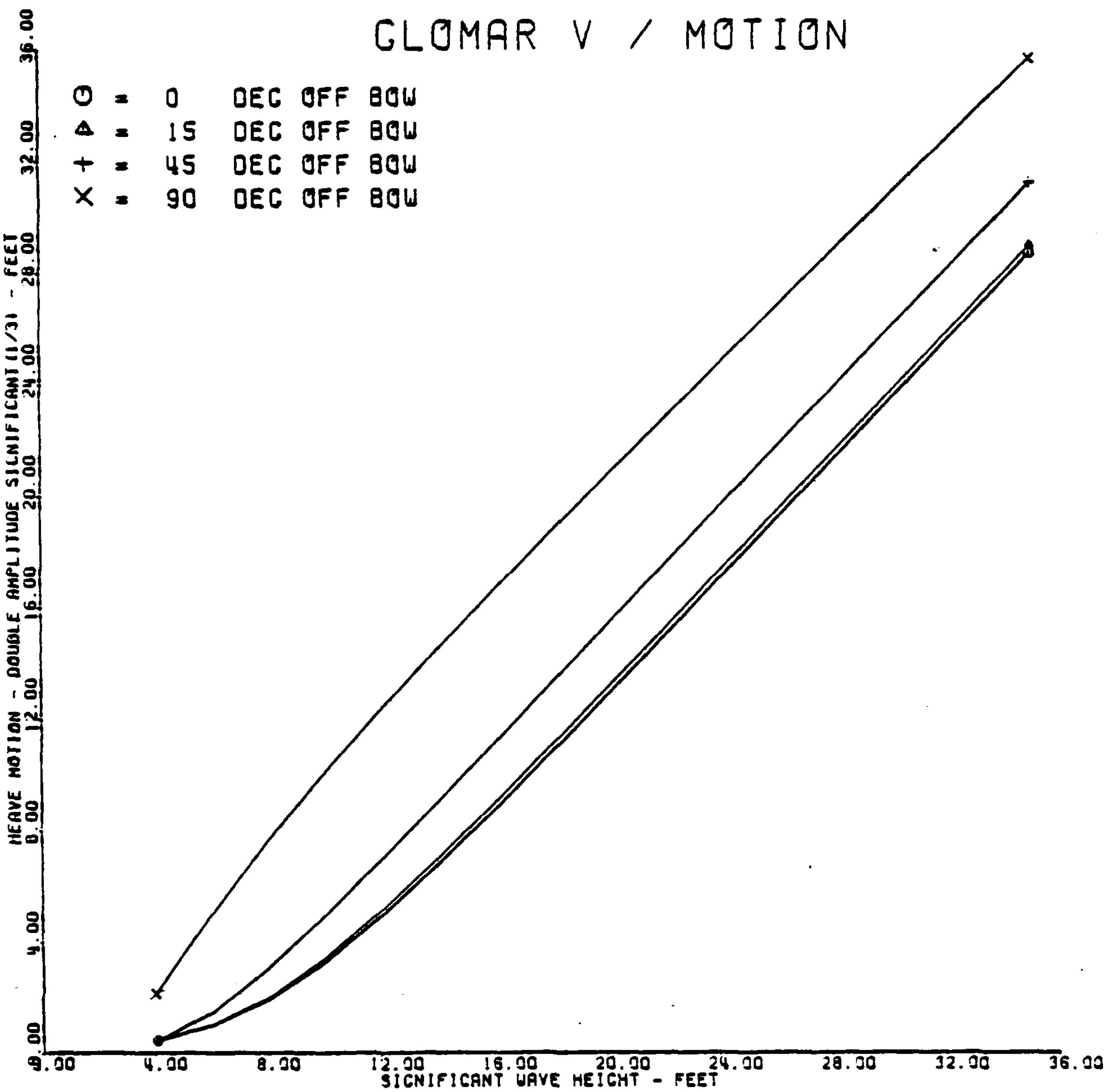
GLOMAR V / RAO
O = 0 DEG OFF BOW
▲ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
ROLL DEG/FT
WAVE PERIOD - SECONDS

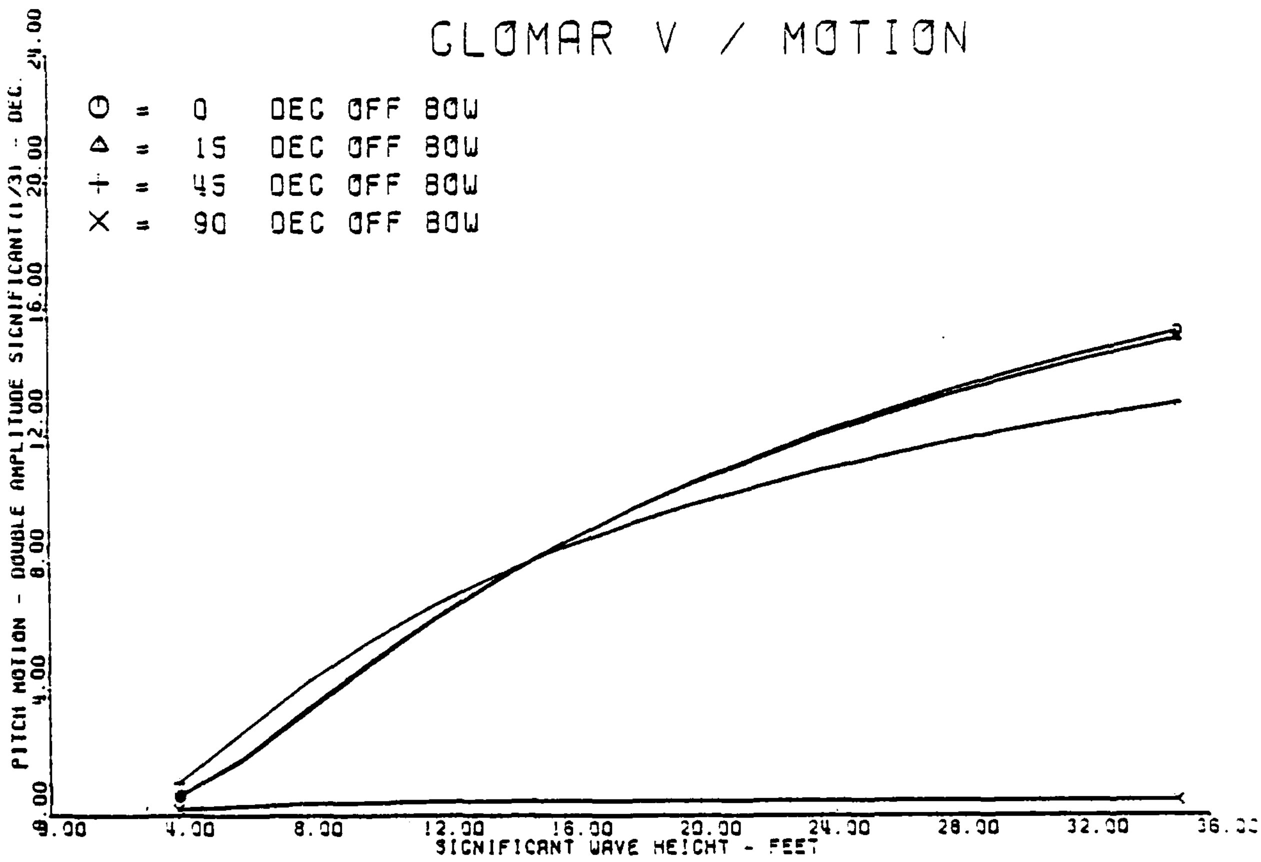

CLOMAR V / RAO
Θ = 0 DEG OFF BOW
Δ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
HEAVE , FT/FT
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
WAVE PERIOD - SECONDS
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
26.00



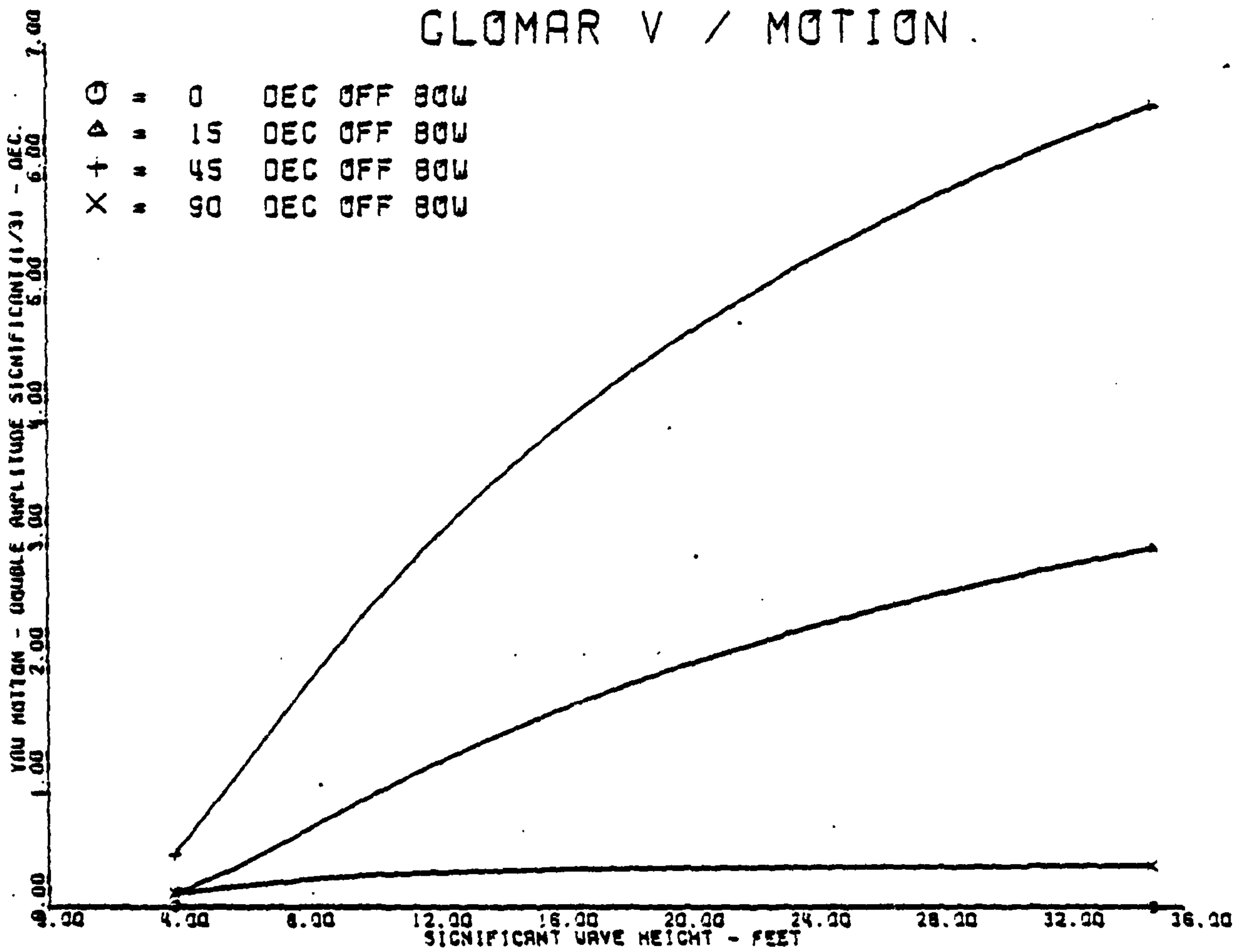
CLOMAR V / RAO
⊖ = 0 DEG OFF BOW
Δ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
PITCH . DEG/FT
0.00
0.20
0.40
0.60
0.80
1.00
1.20
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
26.00
WAVE PERIOD - SECONDS


GLOMAR V / MOTION
O = 0 DEG OFF BOW
△ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
ROLL MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - DEG.
SIGNIFICANT WAVE HEIGHT - FEET
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00
40.00
44.00


GLOMAR V / MOTION
⊙ = 0 DEG OFF BOW
△ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
HEAVE MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - FEET
SIGNIFICANT WAVE HEIGHT - FEET
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00

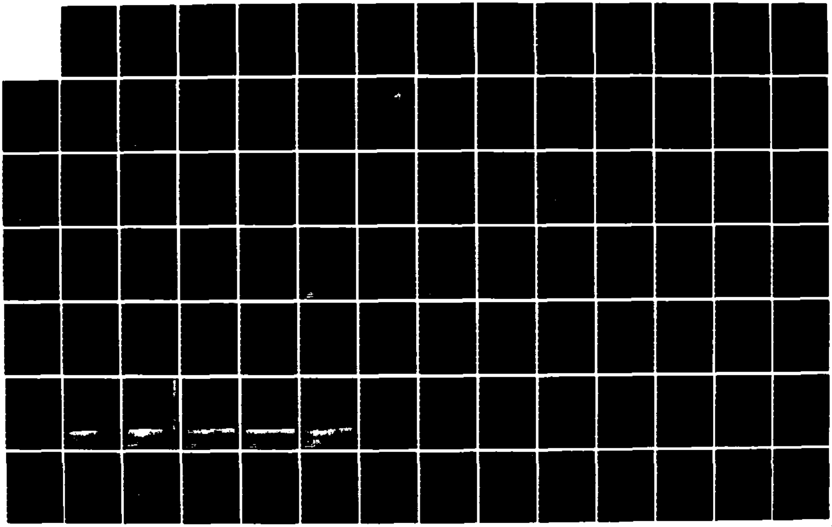


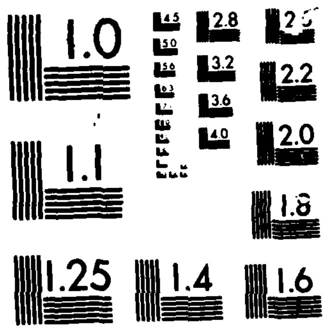
GLOMAR V / MOTION
⊖ = 0 DEG OFF BOW
△ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
× = 90 DEG OFF BOW
PITCH MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - DEG.
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00
SIGNIFICANT WAVE HEIGHT - FEET


GLOMAR V / MOTION
O = 0 DEG OFF BOW
Δ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
YAW MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - DEG.
SIGNIFICANT WAVE HEIGHT - FEET
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00

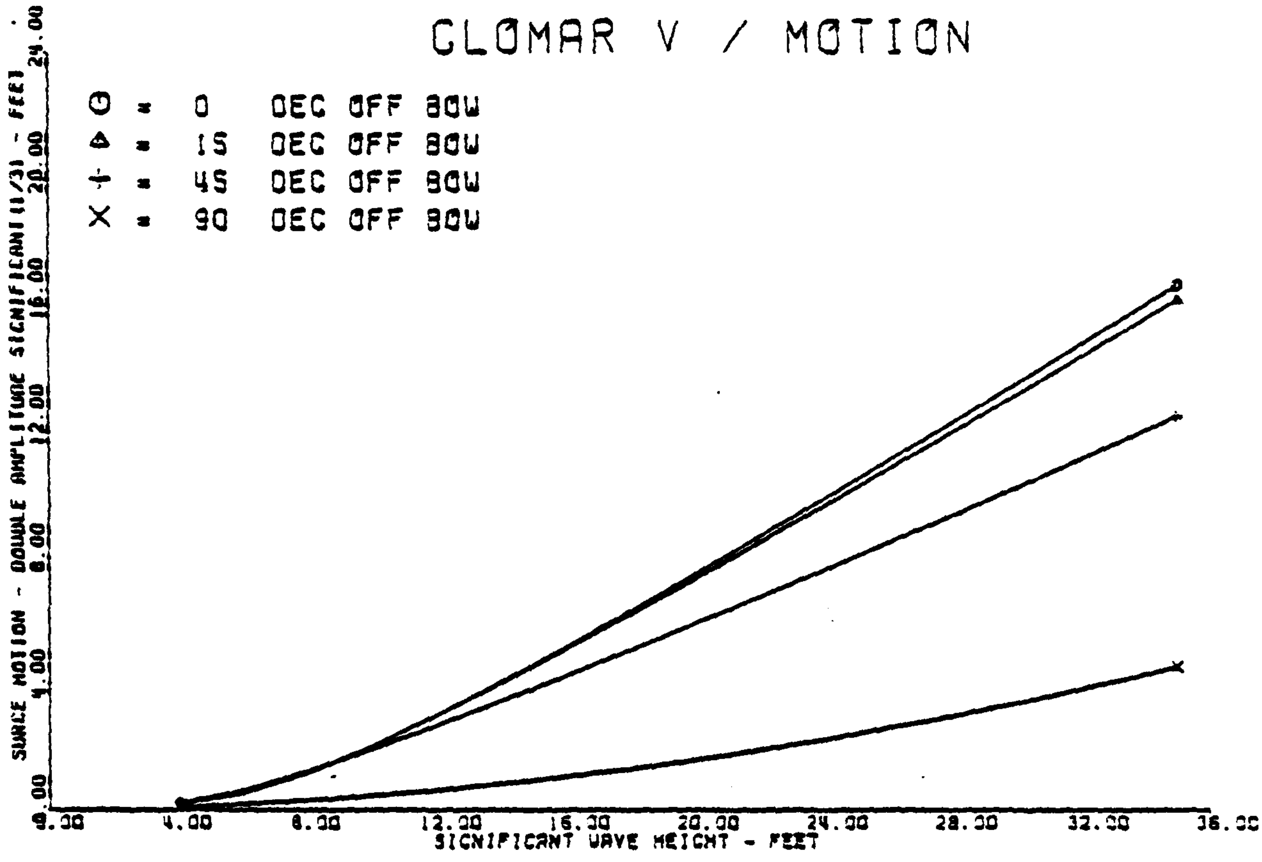
AD-A165 727 WEST COAST OCEAN CONSTRUCTION PLATFORM PRELIMINARY DESIGN STUDY VOLUME 2..(U) GLOBAL MARINE DEVELOPMENT INC NEWPORT BEACH CA JUL 78 GMDI-040072-001-VOL-2 2/6

UNCLASSIFIED CHES/NAVFAC-FPO-1-78-9-PT-2 F/G 13/10 NL

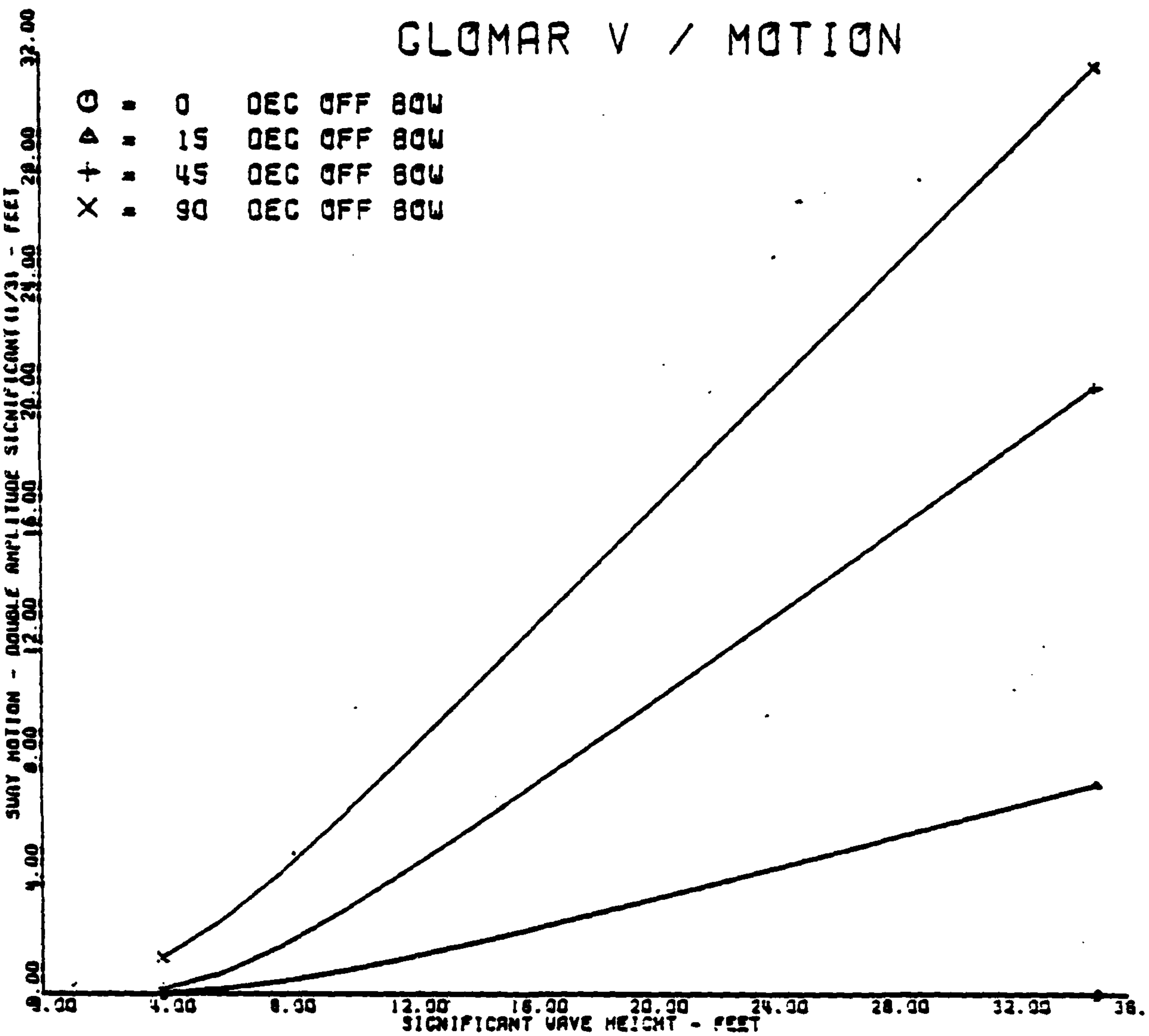




MICROCOPY RESOLUTION TEST CHART



CLOMAR V / MOTION
⊙ = 0 DEG OFF BOW
△ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
SURGE MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - FEET
0.00
4.00
8.00
12.00
16.00
20.00
24.00
SIGNIFICANT WAVE HEIGHT - FEET
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00


GLOMAR V / MOTION
⊙ = 0 DEG OFF BOW
△ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
SWAY MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - FEET
SIGNIFICANT WAVE HEIGHT - FEET

APPENDIX K

WCOCP POSITIONING POWER

JCS 04072

5 1

12 MAR 78 WCOCP POSITIONING POWER

REF: (1) SOME ASPECTS OF BOW THRUSTER DESIGN; GEORGE R. STUNTZ & ROBERT J. TAYLOR; SNAME TRANSACTIONS, VOL 72, 1964

(2) MOBIL DRILLING UNITS, ABS, 1973

(3) A SIMPLIFIED APPROACH TO BOW THRUSTER SIZING, DONALD E. RIDLEY; SNAME, SAN DIEGO SECTION, JAN 20, 1971

FOR WIND LOAD

FROM REF (1)

$C_{DW} = 0.70$ WIND DRAG COEFF, FIG 21 @ $\theta_w = 90°$

$$= \frac{F_w \cos(\alpha - \theta_w)}{(\rho/2)\, v^2 (A \sin^2\theta_w + B' \cos^2\theta_w)}$$

when $\theta_w = 90°$ $\alpha = 90°$ (FIG 23)

$$C_{DW} = F_w / (\rho/2)\, v^2 A$$

where F_w = wind force in lbs

v^2 = wind velocity in fps

A = Above water projected lateral area in ft²

ρ = mass density of air = 0.002378 (lbs - sec²/ft⁴)

$$\therefore F_w = (0.70)(0.002378)\, V_k^2 \left(\frac{1}{.594}\right)^2 A$$

$$= 0.00472\, V_k^2 A$$

V_k^2 = wind speed in knots

JCS

04072
5 2

12 MAR '78 WCOCP D.P. POWER

FROM REF (2)

$$F_w = 0.00338\, V_k^2\, A$$

∴ USE REF(1) FORMULA SINCE IT PRODUCES A HIGHER VALUE.

FOR CURRENT LOAD

REF(1)

$C_{cL} = 0.60$ CURRENT DRAG AT $\phi_L = 90°$ ¢ FIG 25

$$= F_c / (\rho/2)\, v^2\, LH$$

WHERE F_c = laterial current Force in Lbs

ρ = Density of saltwater = 1.938 LBS-SEC²/FT⁴

v = current velocity in fps

L = length of ship in ft

H = Draft of ship in ft

(Note: Ref (2) uses $C_{cL} = 0.50$)

$$F_c = (0.60)\left(\frac{1.938}{2}\right) V_c^2 \left(\frac{1}{.594}\right)^2 LH$$

$$= 1.6478\, V_c^2\, LH$$ where V_c^2 is in knots.

JCS

04072

5 3

3/12/78 WCOCP D.P. POWER

FOR YFHB

$$F_w = 0.00472\,\bar{V}_w^2\,A$$

$$F_c = 1.6478\,\bar{V}_c^2\,LH$$

$A = 13(48) - 5(24) + \frac{1}{2}(8)24$ (MN DK HOUSE)
$+ 8(70)$ (01 LVL)
$+ 8(36)$ (02 LVL)

$+ 260(5) + 8(26) + \frac{1}{2}(8)24$ (HULL)

$= 3188\ FT^2$

$$F_w = 15.05\,\bar{V}_w^2$$

$$F_c = 4284.28\,\bar{V}_c$$

F_w = 15.05 LBS FOR 1 KNOT WIND = 0.60 HP *
= 963.20 LBS " 8 " " = 38.53 HP
= 3852.80 LBS " 16 " " = 154.11 HP
= 8668.80 LBS " 24 " " = 346.75 HP
= 15411.20 LBS " 32 " " = 616.45 HP

* USING 25 LBS THRUST / HP INPUT OF
FOR TUNNEL TYPE THRUSTERS (REF 3)

JCS

04072

5 4

3/12/78 WICOCP D.P. POWER

F_c = 4284.28 LBS FOR 1 KNOT CURRENT = 171.37 HP

= 17137.12 LBS " 2 " " = 685.48 HP

= 38558.52 LBS " 3 " " = 1542.34 HP

= 68548.48 LBS " 4 " " = 2741.94 HP

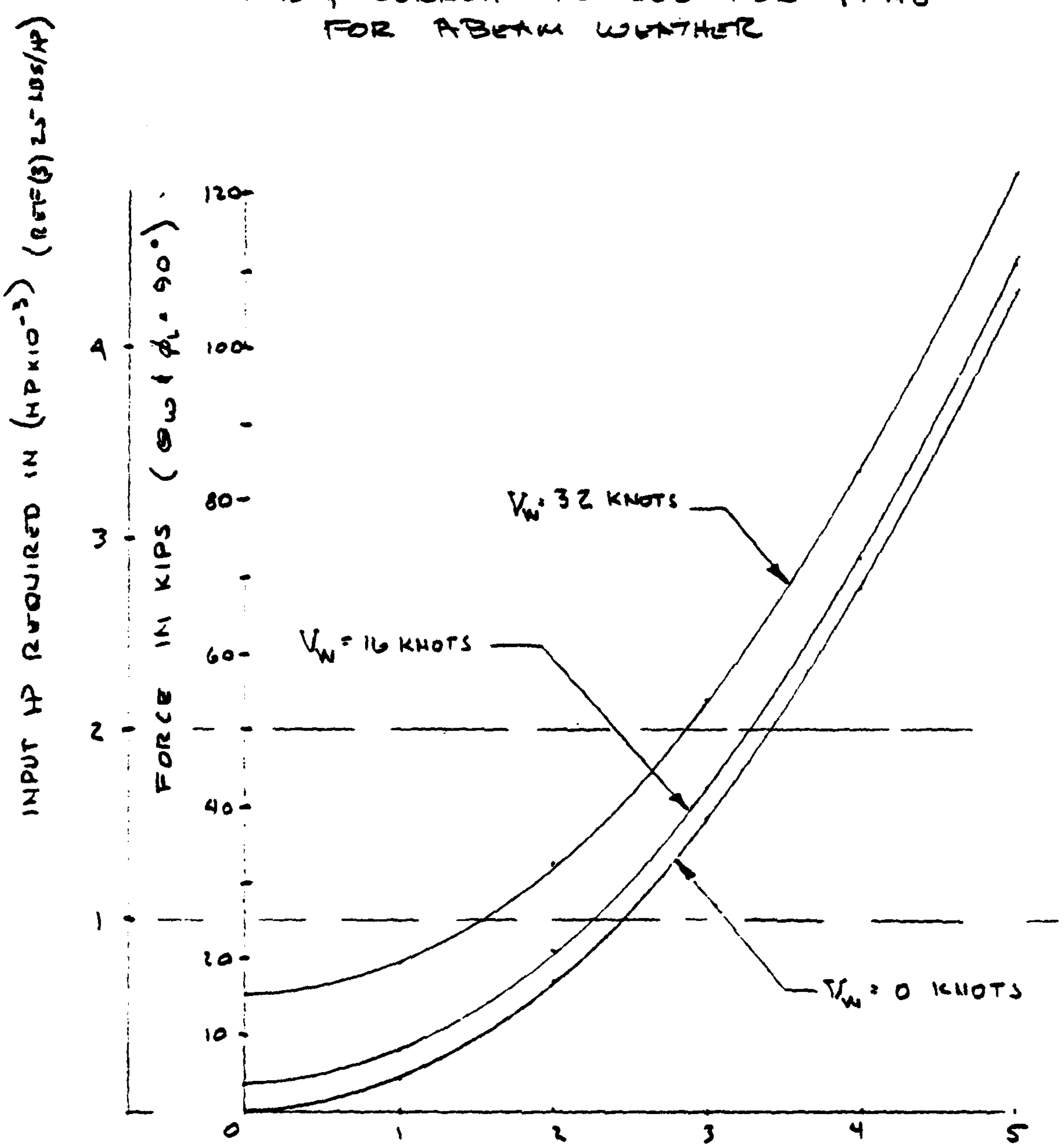
= 107107.00 LBS " 5 " " = 4284.28 HP.

JCS 04072

5 5

3/12/78 WCOCP D.P. POWER

WIND & CURRENT FORCES FOR YFNB FOR ABEAM WEATHER



APPENDIX L

YFNB ELECTRICAL PRELIMINARY DESIGN DATA

NAVY OCEAN CONSTRUCTION PLATFORM
04-12-78

SHIP'S SERVICE SWBD FUNCTION	HP	STARTER SIZE
Fuel oil purifier #1	2	1 15AT
Fuel oil purifier #2	2	1 15AT
Fuel oil transfer pump #1	5	1 15AT
Clean lube oil pump	2	1 15AT
Dirty lube oil pump	1.5	1 15AT
Generator rm supply fan	40	3 70AT
Generator rm exhaust fan	40	3 70AT
Aft fire pump	40	3 70AT
Ship service air compressor #1	50	3 90AT
Ship service air compressor #2	50	3 90AT
General salt water service pump	40	3 70AT
Stby salt water circ pump	40	3 70AT
Main salt water circ pump	40	3 70AT
Sanitary water pump	3	1 15AT
Potable water pump	3	1 15AT
Wash water pump	2	1 15AT
Anchor winch	30	2 50AT
Port capstan	20	2 40AT
Stbd capstan	20	2 40AT
Galley exh fan	5	1 15AT
Galley supply fan	5	1 15AT
Air condition fan qtrs exh	30	3 50AT
Fan rm supply	5	1 15AT
State rm 2nd dk sup	5	1 15AT
Fwd machine rm sup	3	1 15AT
2nd dk supply	5	1 15AT
Engine rm supply fan	5	1 15AT
Air conditioning compressor #1	30	3 50AT
Air conditioning compressor #2	30	3 50AT
Motor door unit	2	1 15AT

NAVY OCEAN CONSTRUCTION PLATFORM
04-12-78

EMERGENCY SWBD FUNCTION	HP	STARTER SIZE
Main engine lube oil prime pump	5	1 15AT
Auxiliary salt water circ pump	20	2 40AT
Fuel oil transfer pump #2	5	1 15AT
Fuel oil service pump	2	1 15AT
Bilge and ballast pump	40	3 70AT
Main eng start air compressor	10	2 20AT
Fwd fire pump	50	3 90AT

NAVY OCEAN CONSTRUCTION PLATFORM
POWER & LIGHTING PANEL LOCATION & DESIGNATION
04-18-78

DESIGNATION		LOCATION	
Laundry pwr panel	48kw, 480V	Laundry rm	FR 12
Electrical shop	8kw, 480V	Elec shop rm	FR 13→14
Main deck pwr panel	50kw, 480V	Main deck	FR 14
Heating pwr panel #1	100kw, 480V	Second deck	FR 11
Heating pwr panel #2	50kw, 480V	TBD	
Galley pwr panel	90kw, 480V	Main deck	FR 7
Machine shop pwr panel	10kw, 480V	Main deck	FR 14
Sewage Plant cntl pnl	30kw, 480V	Second deck	FR 11
Reefer control	8kw, 480V	Main deck	FR 7
Galley panel	20kw, 208/120V	Main deck	FR 7
Small vent pwr pnl	10kw, 208/120V	Main deck	FR 14
Lighting pnl #1	28kw, 120V	Passageway, second deck	FR 12→13
Lighting pnl #2	28kw, 120V	Electric, shop main deck	FR 13→14
Lighting pnl #3	28kw, 120V	Second dk TBD	
Lighting pnl #4	8kw, 208/120V	Main deck	FR 14
Emergency lighting pnl	28kw, 120V	TBD	
Navigation lighting pnl	3kw, 208/120V	02 deck	

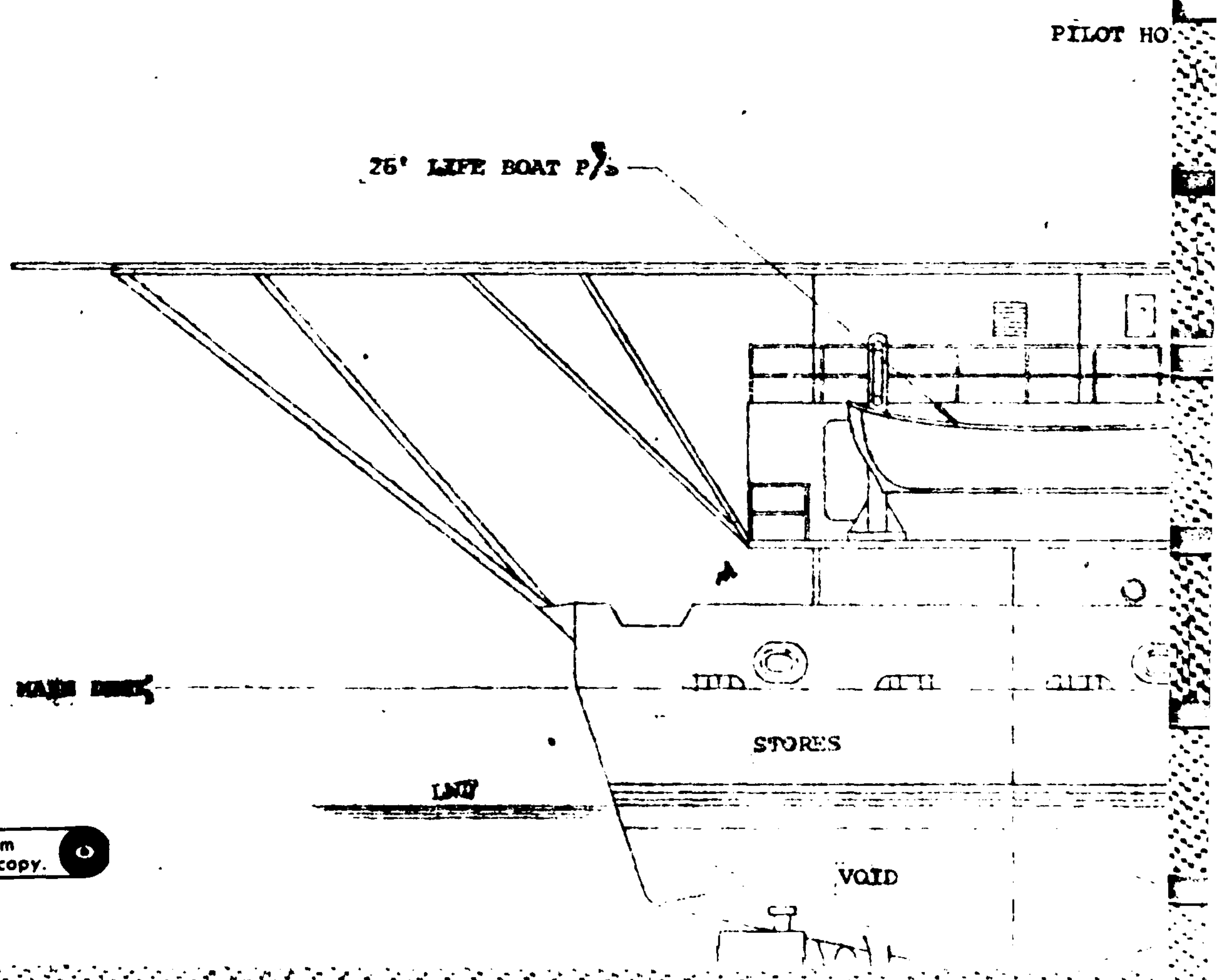
NAVY OCEAN CONSTRUCTION PLATFORM
MAJOR EQUIPMENT FOR POWER SYSTEMS
04-12-78

QTY	DESCRIPTION
2	Caterpillar D-379 Marine Eng., and 500kw, 480V, 3 Ø Kato Generator
1	Caterpillar 3406 185kw Marine Generator Set
2	Generator Control Modules (unitized)
1	Emergency Generator Control Module
16	Motor Control Modules
14	Size 3 Starters
23	Size 1 Starters
5	Size 2 Starters
1	Size 4 Starter (spare)
10	100 AF - 15AT Breakers
4	100 AF - 20AT Breakers
4	100 AF - 30AT Breakers
4	100 AF - 40AT Breakers
4	100 AF - 50AT Breakers
2	100 AF - 70AT Breakers
5	100 AF - 90AT Breakers
1	225 AF - 125AT Breakers
2	225 AF - 150AT Breakers
2	600 AF - 600AT Breakers
3	600 AF - 300AT Breakers
3	1000 AF - 700AT Breakers with Interlock
1	1000 AF - 250AT Breakers with Interlock

ELECTRICAL DRAWINGS

R.4072-E001	Electrical Distr. Layout (Preliminary)
D.4072-E002	Electical Equipment

(1)



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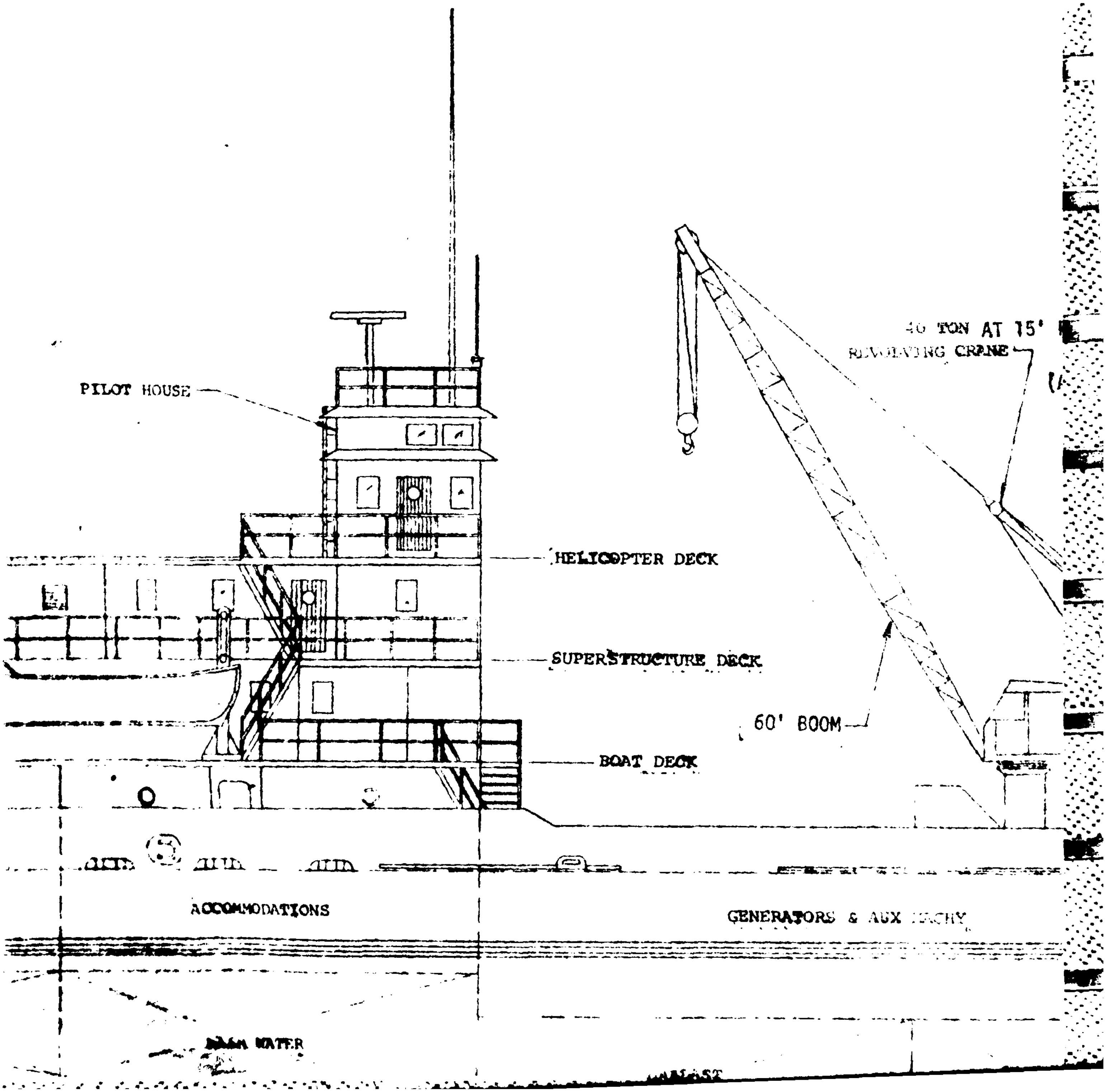
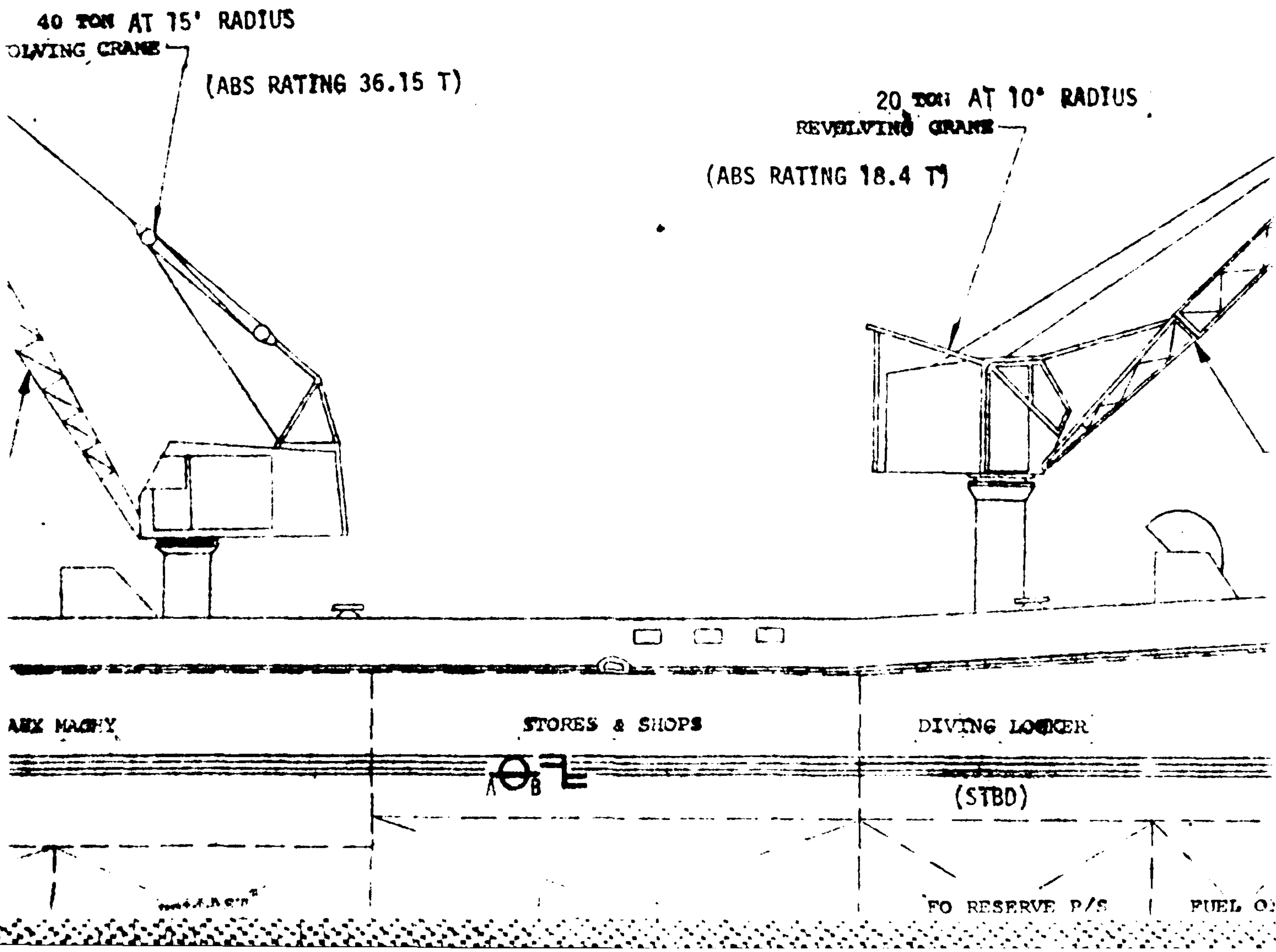
2



TON AT 15'
CRANE
PILOT HOUSE
HELICOPTER DECK
SUPERSTRUCTURE DECK
60' BOOM
BOAT DECK
ACCOMMODATIONS
GENERATORS & AUX
WATER

3



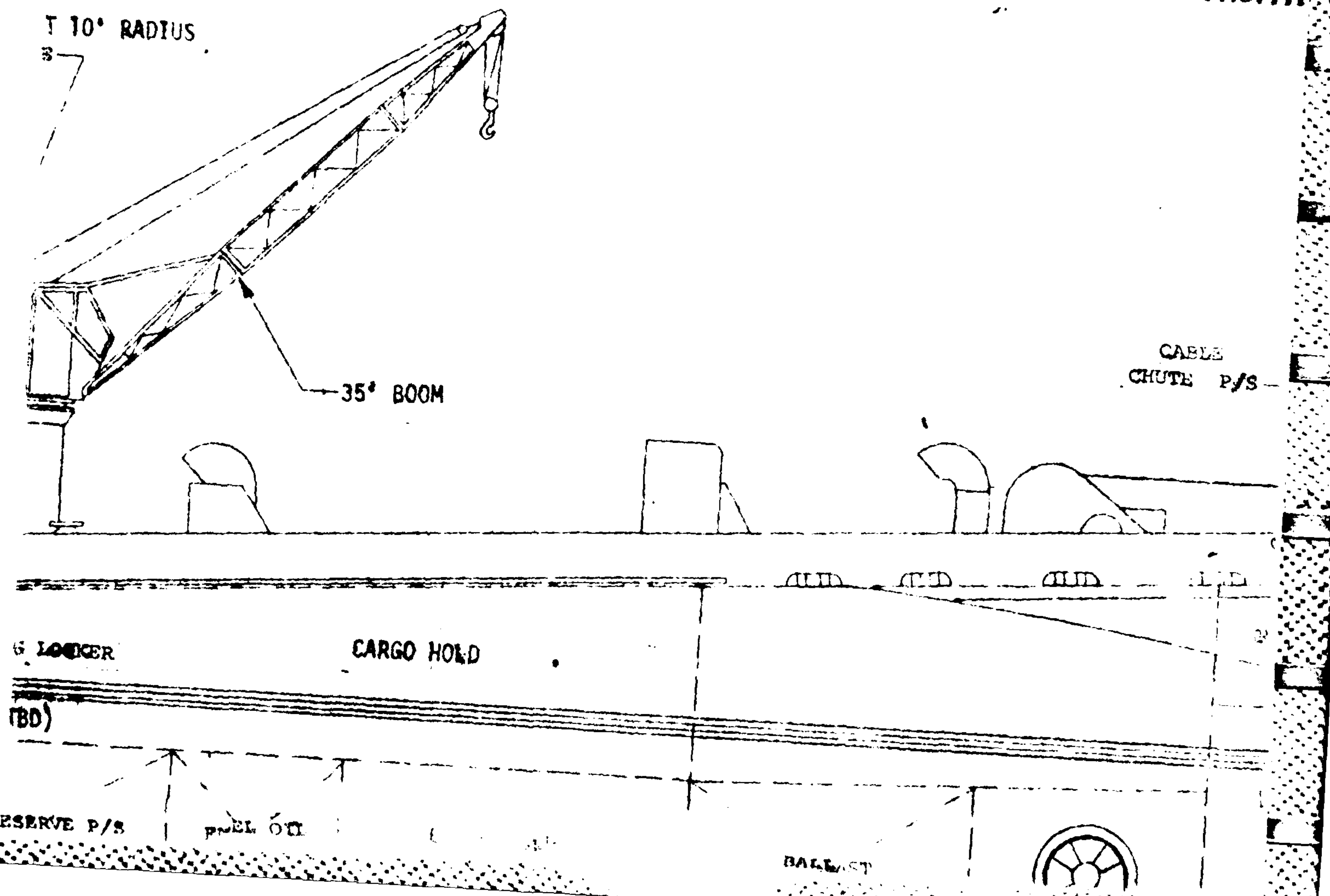
40 TON AT 15' RADIUS
OLVING CRANE
(ABS RATING 36.15 T)
20 TON AT 10' RADIUS
REVOLVING CRANE
(ABS RATING 18.4 T)
AUX MACHY
STORES & SHOPS
DIVING LOCKER
(STBD)
FO RESERVE P/S

(4)

CAPACITI

LENGTH
LENGTH
DEPTH (
BEAM
LOADED
LIGHT DI
LOADED
PERSONN
CARGO C
WASH W
POTABLE
FUEL OIL
LUBE OIL

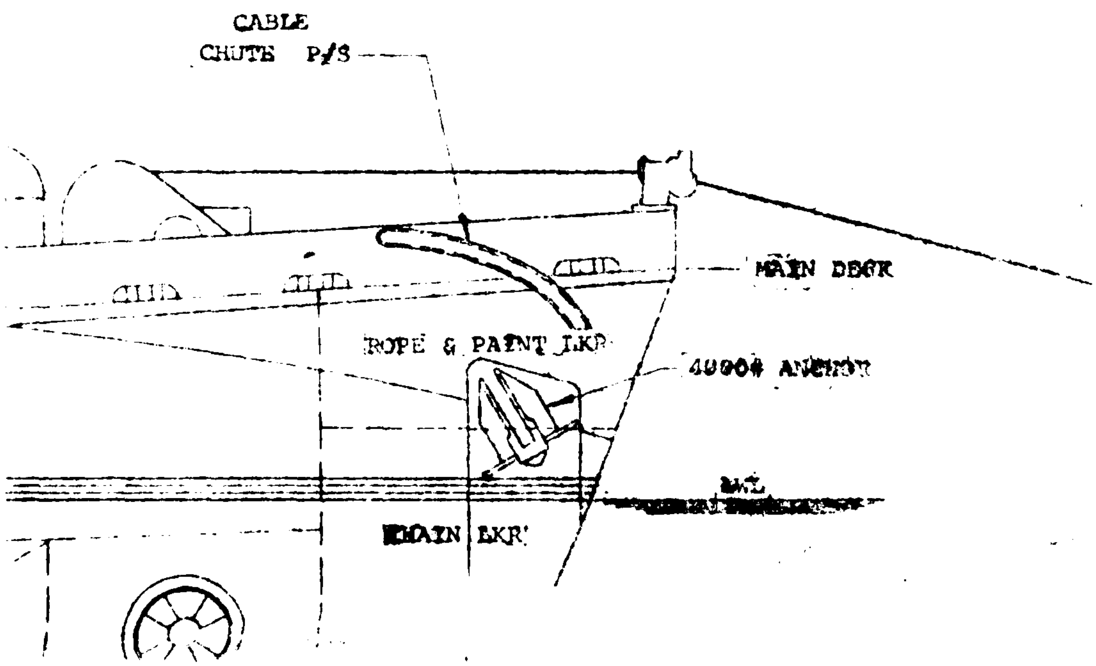
CAPACITI

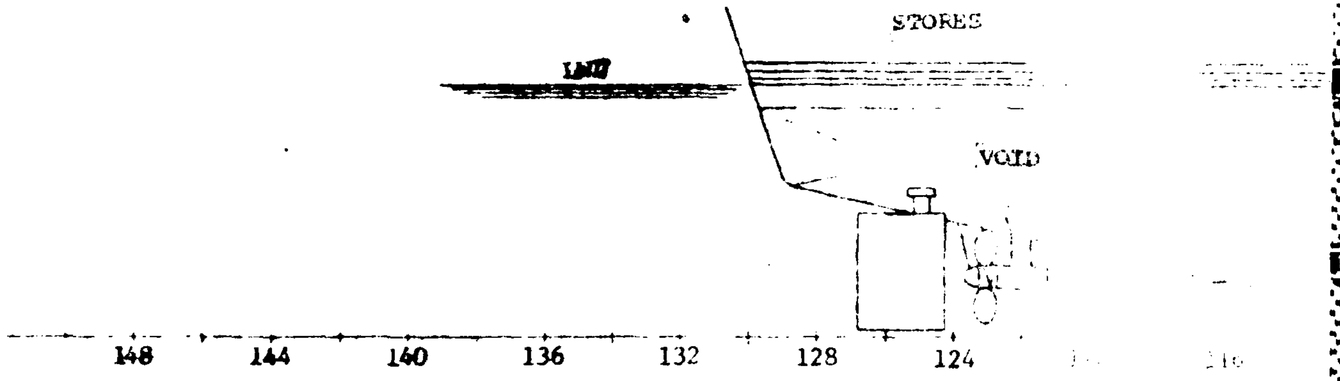


CAPACITIES & DIMENSIONS

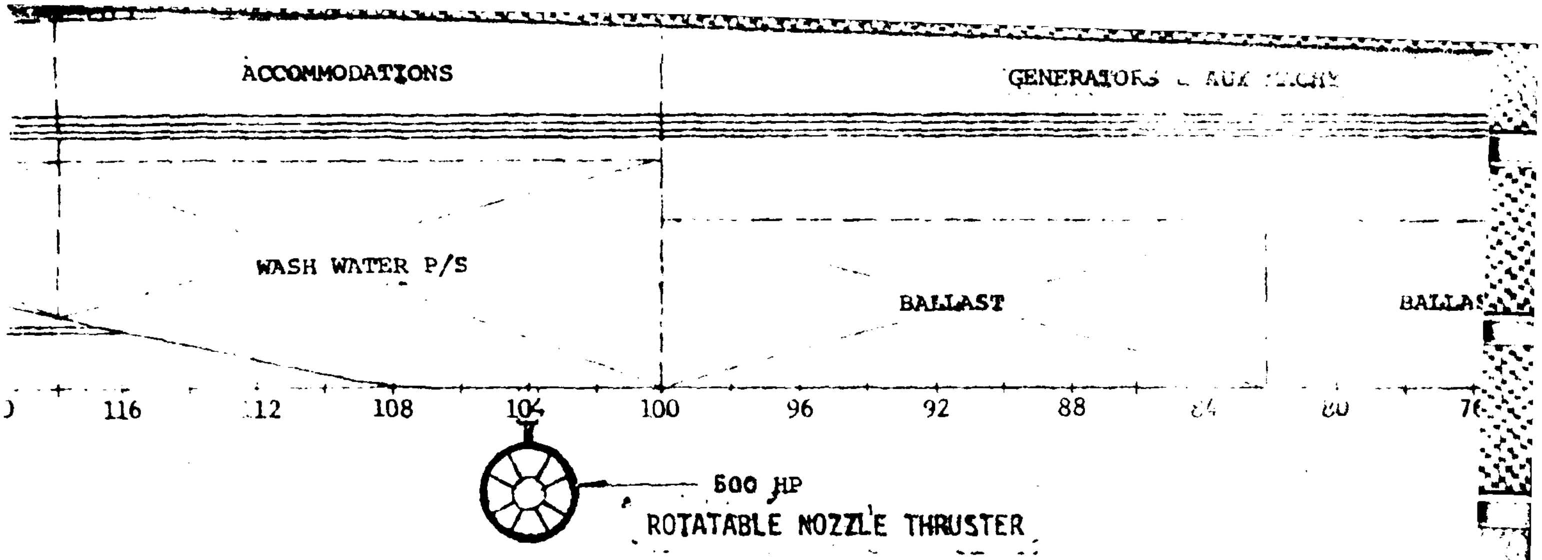
LENGTH OVERALL	[redacted]
LENGTH B.P.	[redacted]
DEPTH (MOLDED)	[redacted]
BEAM	[redacted]
LOADED DRAFT	[redacted]
LIGHT DISPLACEMENT	[redacted]
LOADED DISPLACEMENT	[redacted]
PERSONNEL	[redacted]
CARGO CAPACITY	[redacted]
WASH WATER	2422 [redacted]
POTABLE WATER	10[redacted]
FUEL OIL (95%)	140[redacted] 61537 GALS
LUBE OIL (95%)	99 BBLS

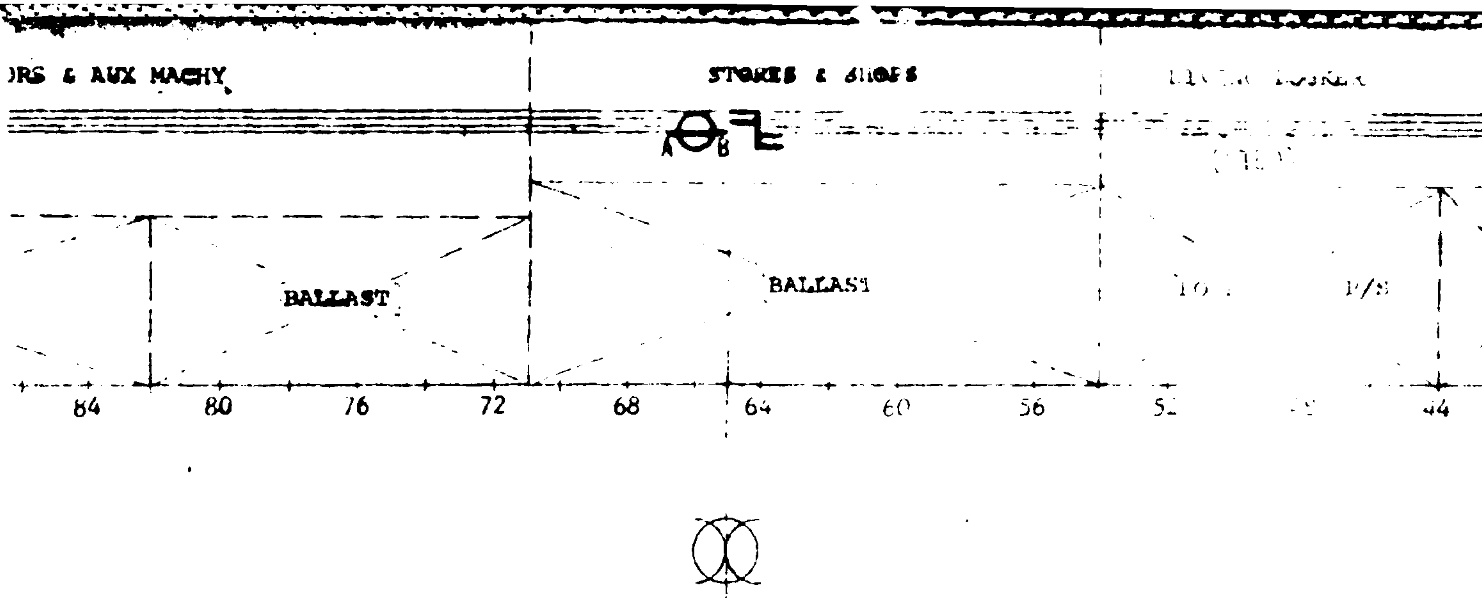
CAPACITIES DO NOT INCLUDE RESERVE FUEL OIL TANKS.



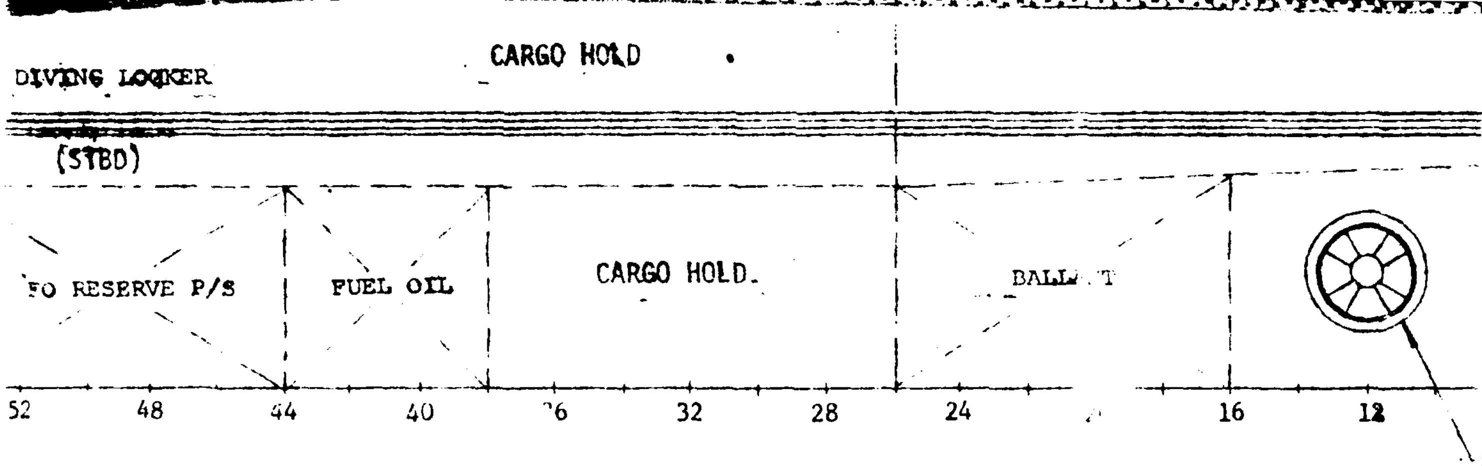


6


ACCOMMODATIONS
GENERATORS
WASH WATER P/S
BALLAST
116
108
104
100
96
92
88
500 HP
ROTATABLE NOZZLE THRUSTER



OUTBOARD PROFILE



NOTE

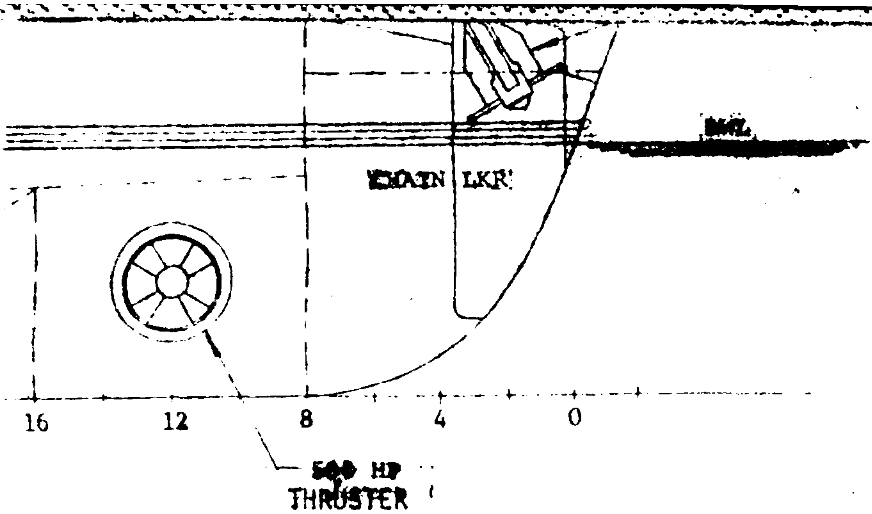
WELD
PROF

RESERVAT

THIS DR/

NO

NO REQ'D	NEXT ASSEMBLY
	ALTERATION
	DATE
	SHIPYARD



NOTES:

WELDED STEEL HULL A.B.S. & U.S.C.G. APPROVAL
PROPULSION: 2-700 HP MOTORS (D.C.)

RESERVATION

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NO	DATE	BY	DESCRIPTION	APPROVED

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XT ASSEMBLY
LTERATION
ATE
ARD
ANGELES
NICAL SERVICES

NAVFAC (FPO-1)

CONSTRUCTION PLATFORM
ULL CONVERSION

RESERVATION

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NO	DATE	BY	DES...

ALTERATIO...

GLOBA...
DEVELO...
Los An...

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	NO REQ'D		NEXT ASSEMBLY
			ALTERATION
			DATE
			SHIPYARD
			LOS ANGELES
			TECHNICAL SERVICES
			PURCHASING
			ESTIMATING
			USCG
			ABS

NAVFAC (F...

WEST COAST OCEAN CON...
COMMERCIAL HUL...

		DATES
ENGR.	SCHAFF	3/76
DFT.	EES	
CHK.	K Schaff	4/76
APPR.	[illegible]	5/...
REL.	[illegible]	...

SCALE: 3/32" = 1' 0"

JOB AUTH. 04072-010000

11

RESERVATION

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NEXT ASSEMBLY
ALTERATION
DATE
...IPYARD
...S ANGELES
...CHNICAL SERVICES
...RCHASING
...TIMATING
...CG
...S

NAVFAC (FPO-1)

WEST COAST OCEAN CONSTRUCTION PLAT...
COMMERCIAL HULL CONVERSION

		DATES
ENGR.	Schaeff	3/78
DFT.	EES	
CHK.	Schaeff	4/78
APPR.	[illegible]	5/4/78
REL.	[illegible]	5/4/78

SCALE: $\frac{3}{32}$" = 1' 0"

TOLERANCE UNLESS ... NOTED
FRACTION ± 1/16"
DECIMAL ... .03
ANGULAR ± ½° ... .010

JOB AUTH. 04072-010000

DWG. NO. D • 04072 • ...

ALT A

SHEET 1 OF ...

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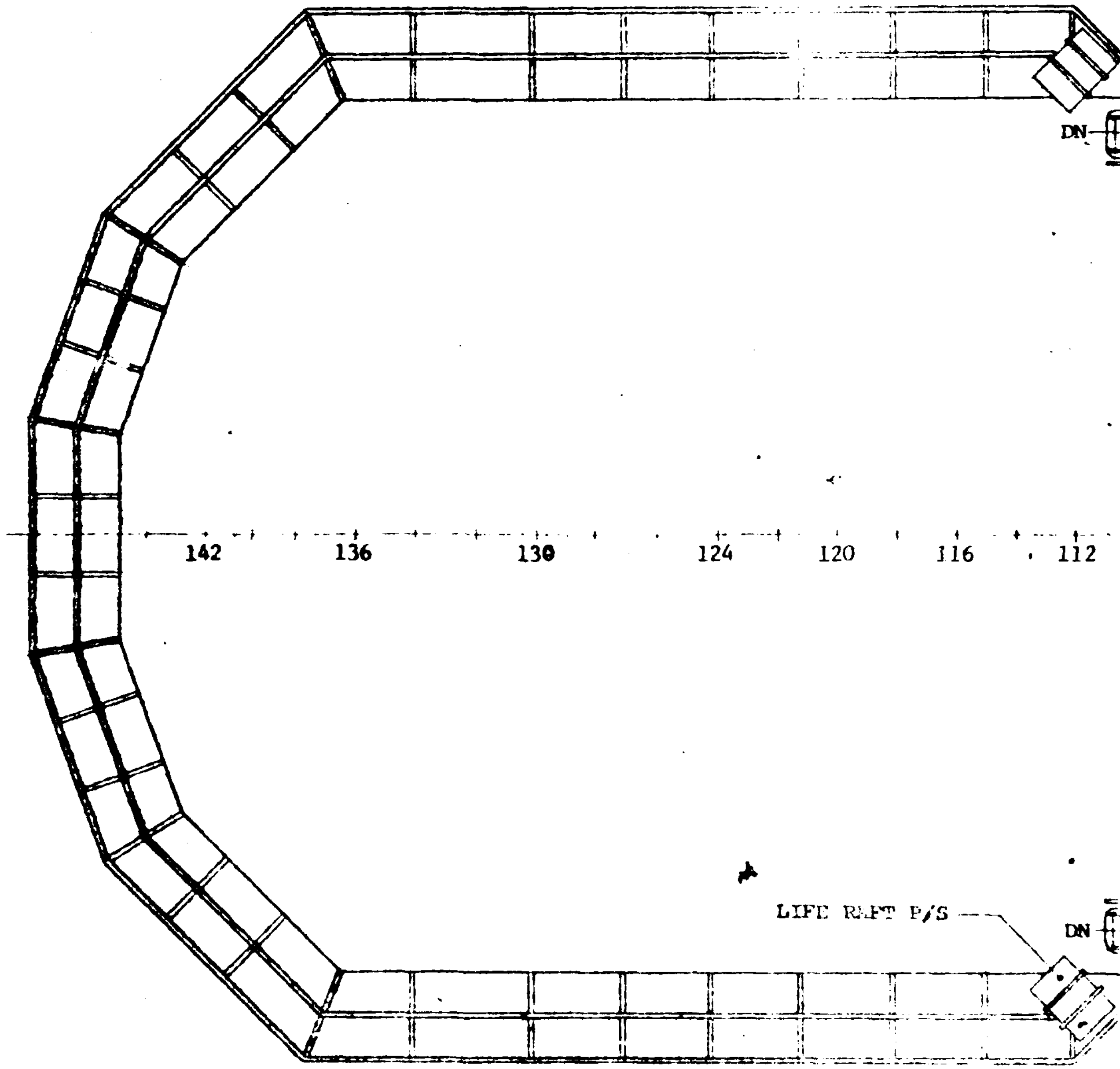

PILOT HOUSE, HELICOPTER DECK

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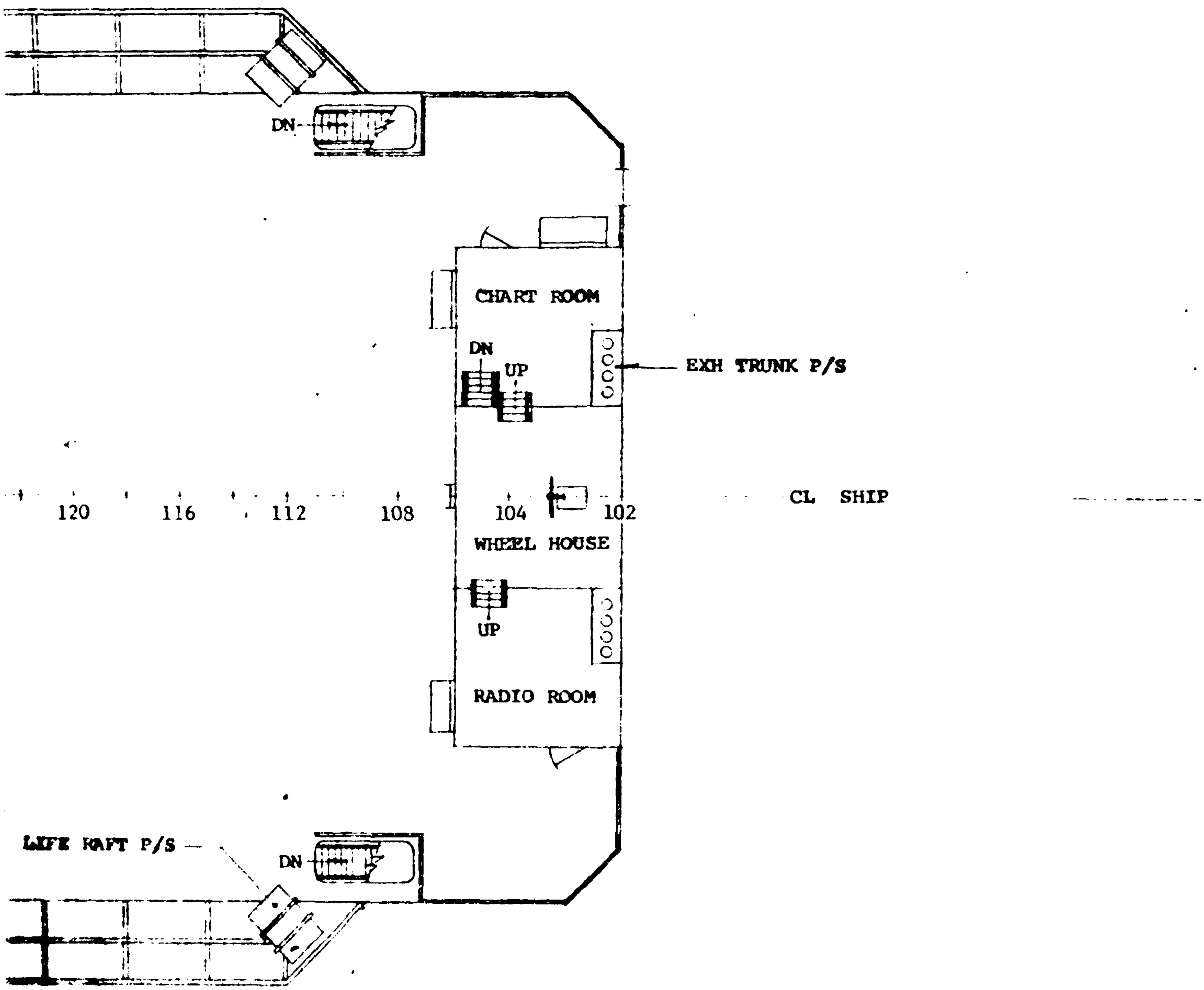
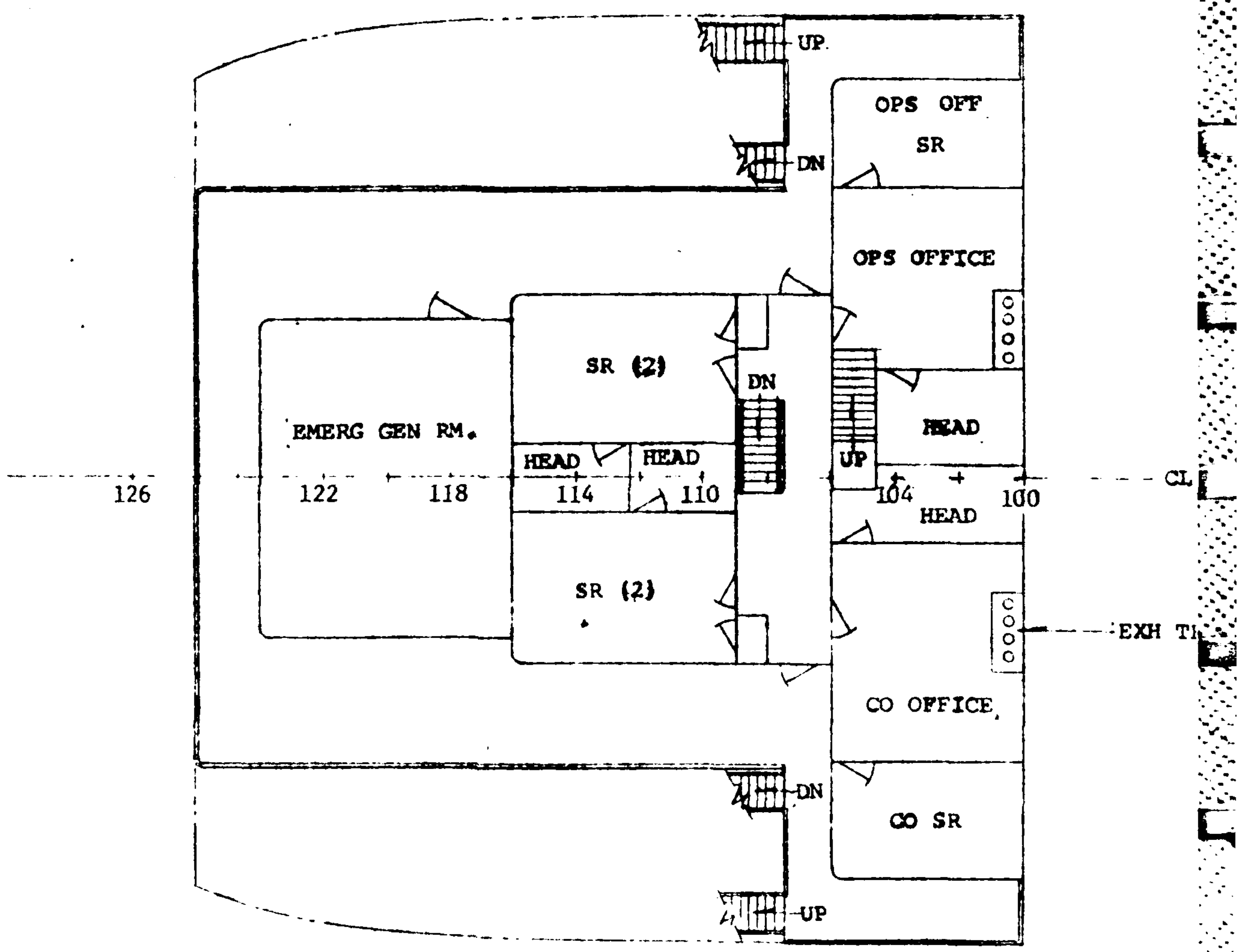

DN
CHART ROOM
DN
UP
EXH TRUNK P/S
CL SHIP
120
116
112
108
104
102
WHEEL HOUSE
UP
RADIO ROOM
LIFE RAFT P/S
DN

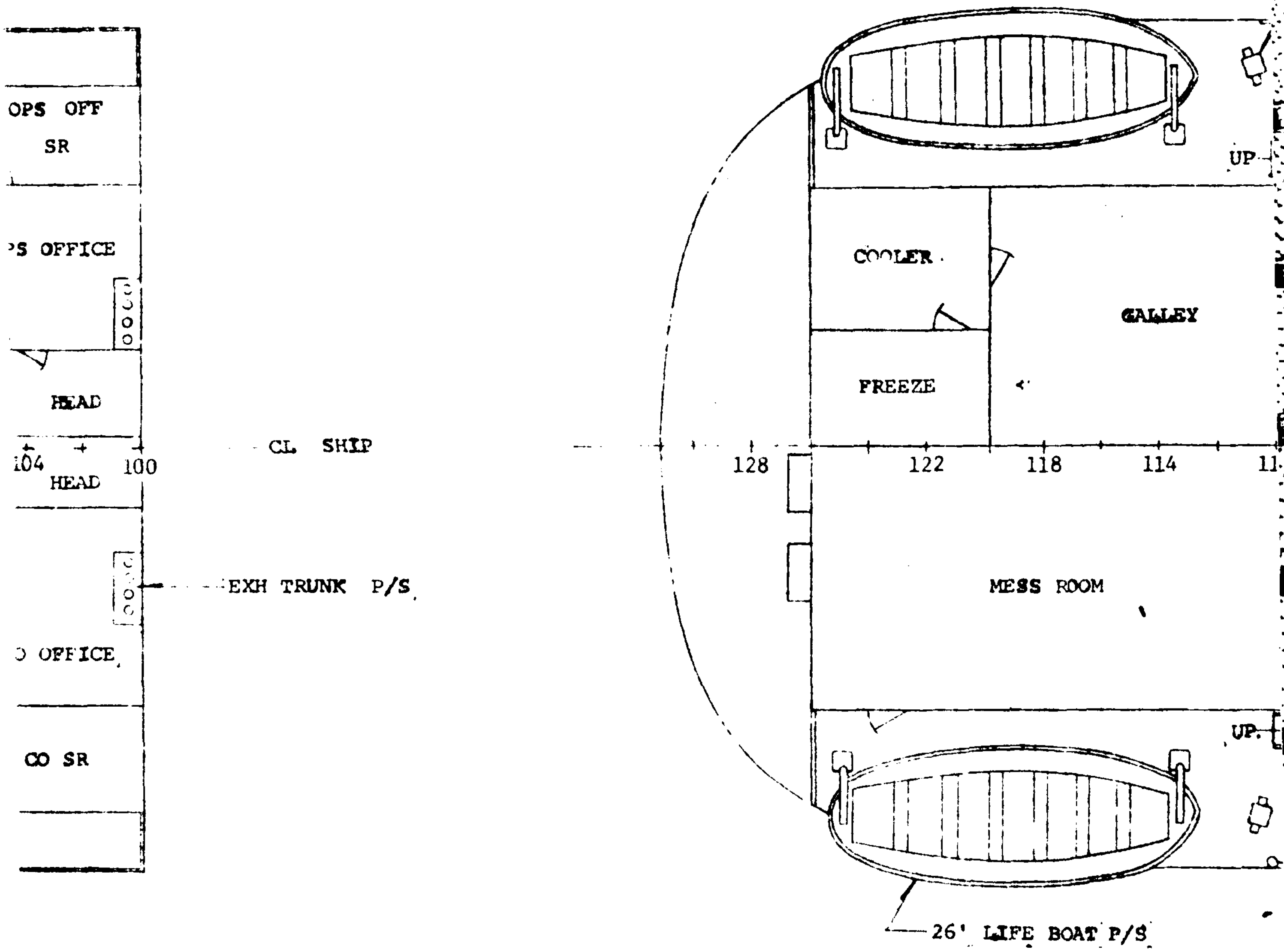
ER DECK

(3)



SUPERSTRUCTURE DECK

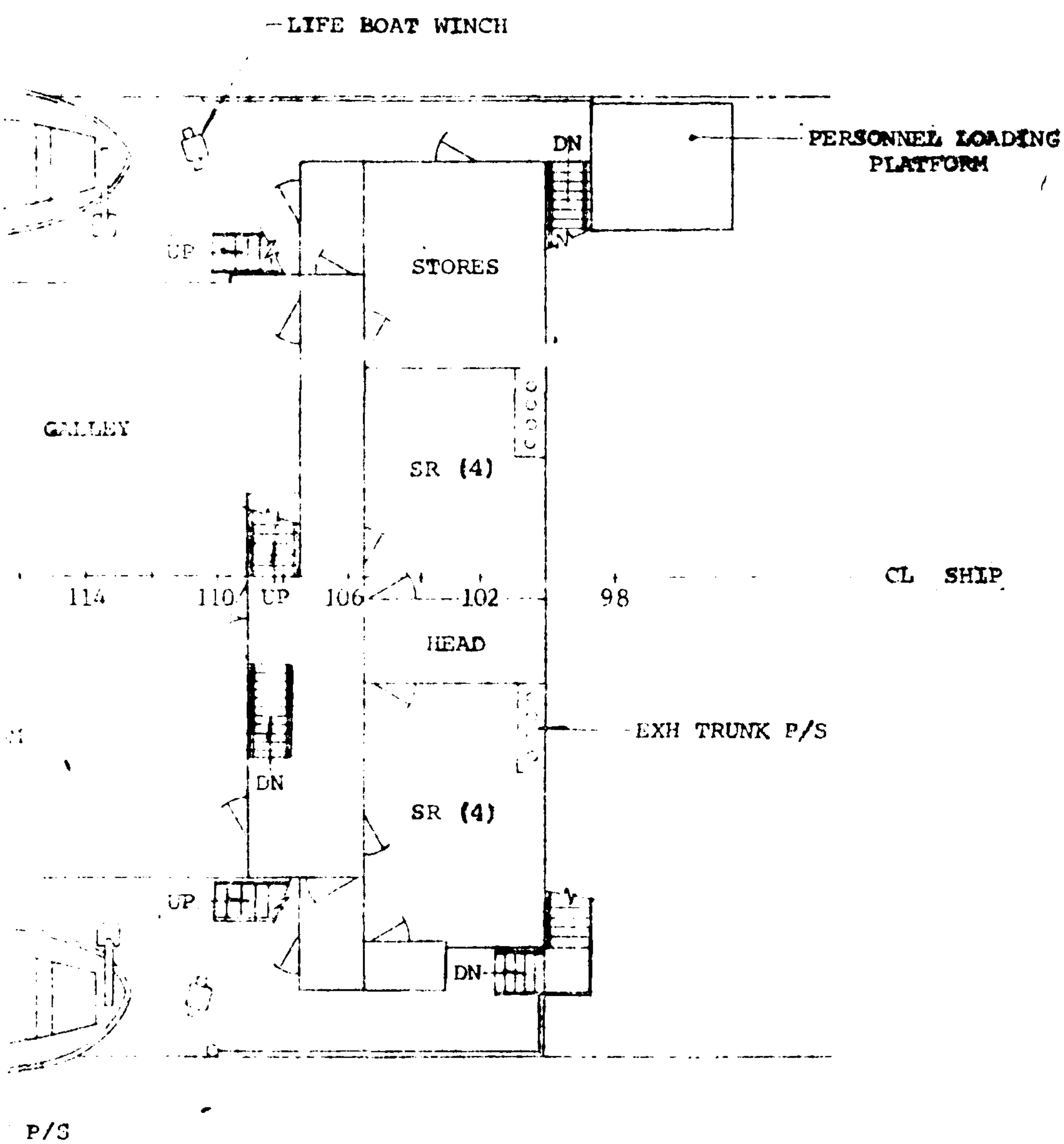
(4)



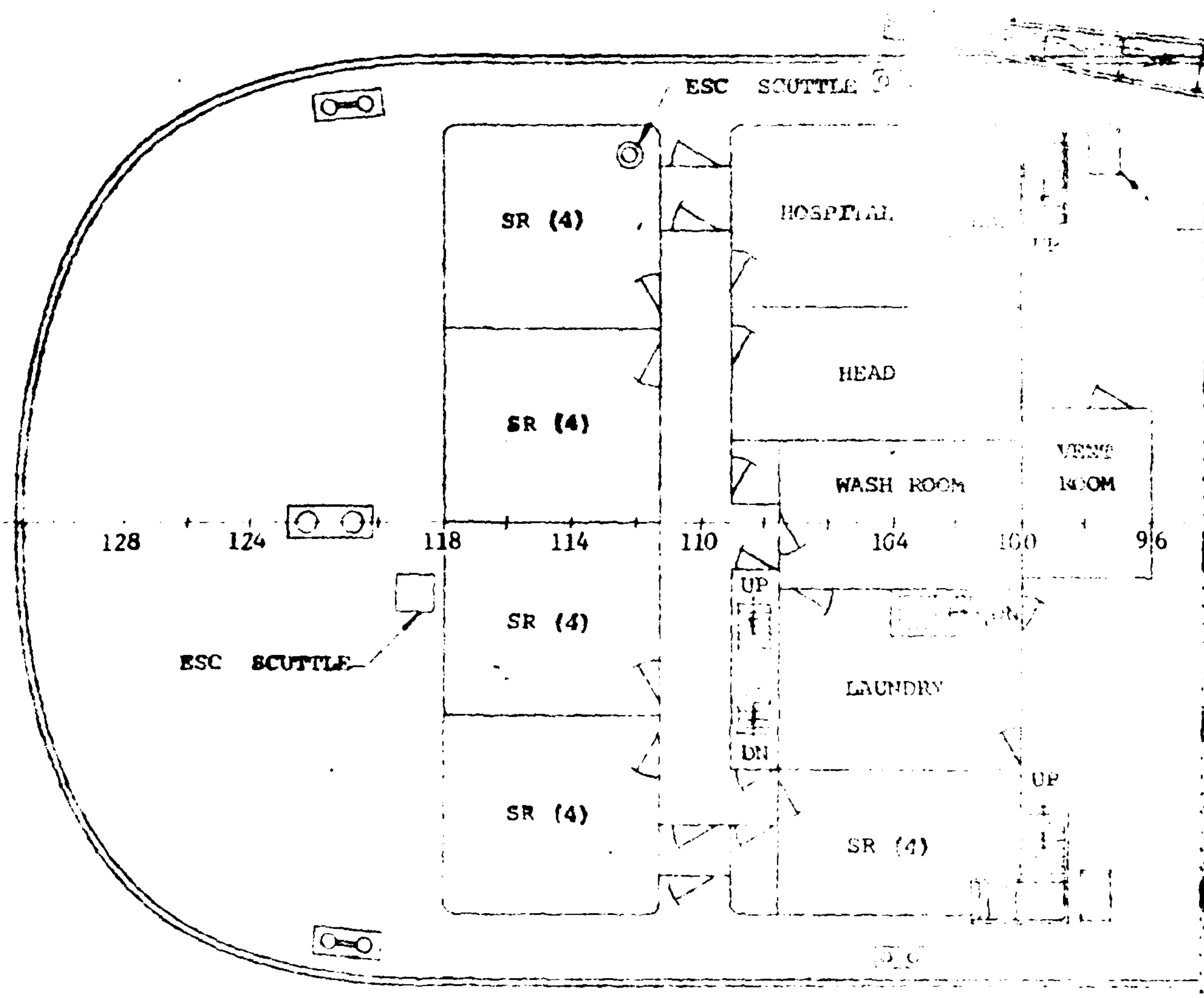
OPS OFF
SR
PS OFFICE
HEAD
104
100
HEAD
CL SHIP
EXH TRUNK P/S
O OFFICE
CO SR
UP
COOLER
GALLEY
FREEZE
128
122
118
114
MESS ROOM
UP
26' LIFE BOAT P/S

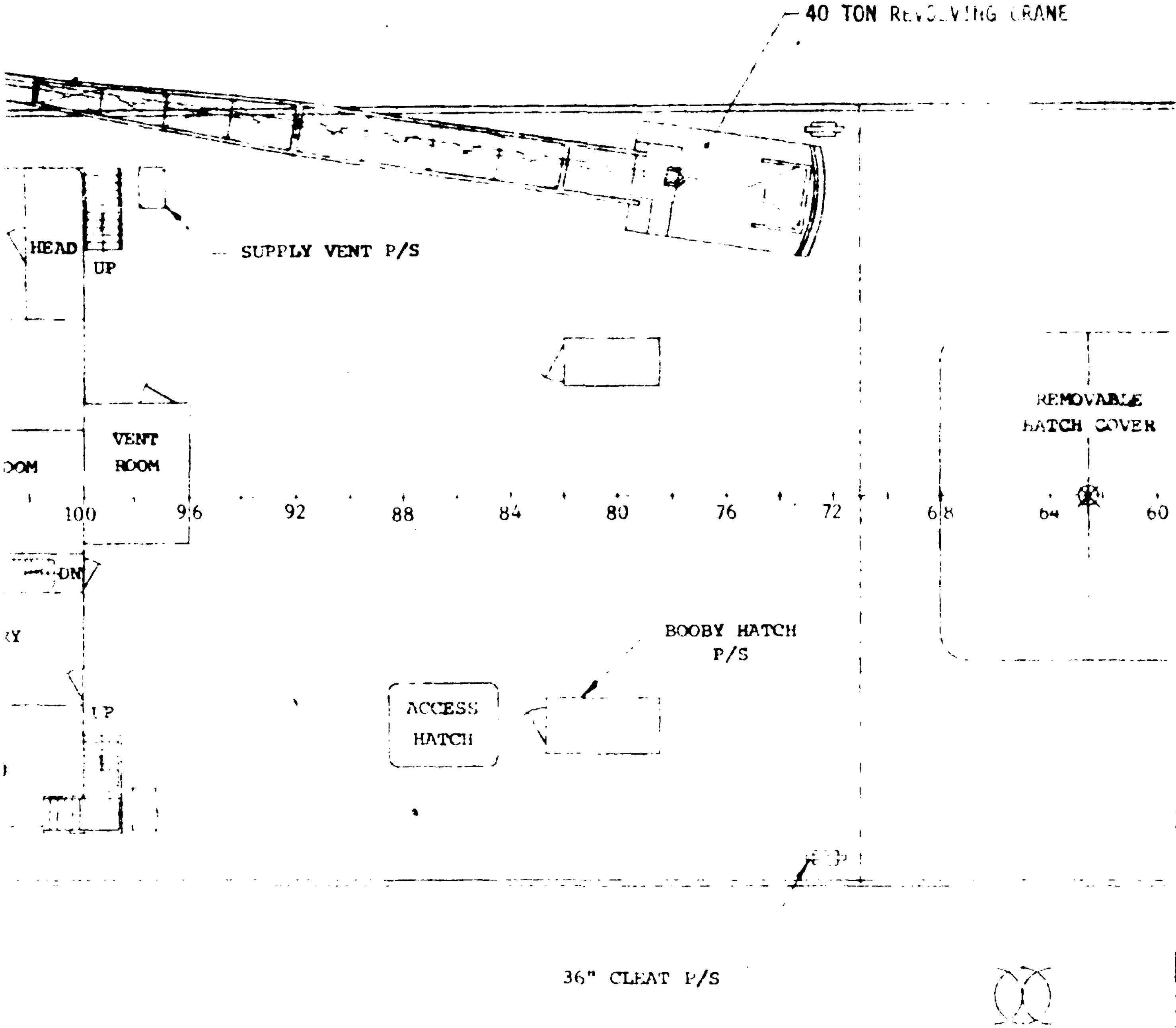
BOAT DECK

⑤


LIFE BOAT WINCH
PERSONNEL LOADING PLATFORM
DN
UP
STORES
GALLEY
SR (4)
CL SHIP
114
110
UP
106
102
98
HEAD
EXH TRUNK P/S
DN
SR (4)
UP
DN
P/S

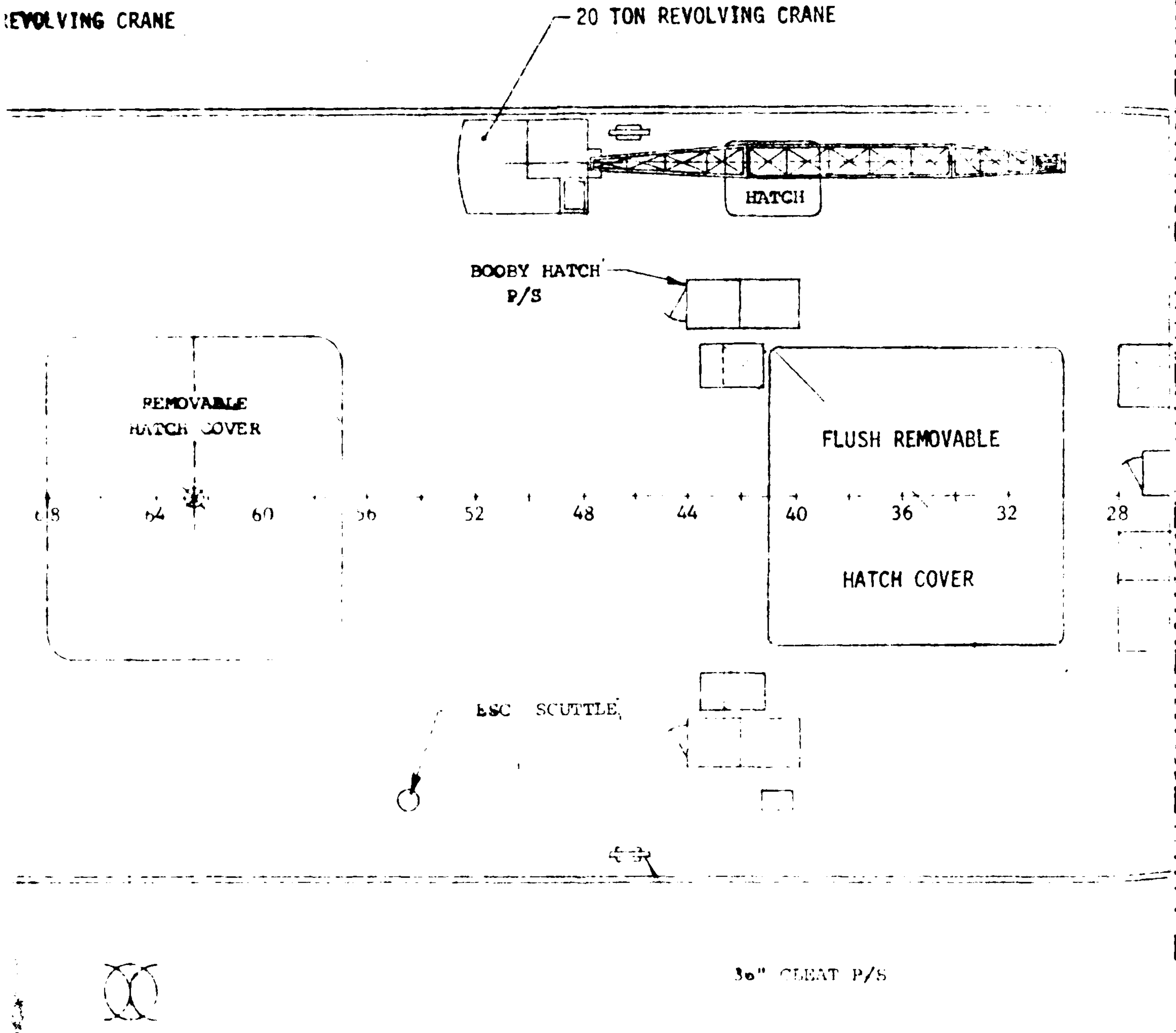
BOAT DECK


ESC SCUTTLE
SR (4)
HOSPITAL
SR (4)
HEAD
WASH ROOM
VENT ROOM
128
124
118
114
110
104
100
96
UP
SR (4)
ESC SCUTTLE
LAUNDRY
DN
UP
SR (4)
SR (4)



40 TON REVOLVING CRANE
HEAD
UP
SUPPLY VENT P/S
REMOVABLE HATCH COVER
VENT ROOM
100
96
92
88
84
80
76
72
68
64
60
DN
BOOBY HATCH P/S
ACCESS HATCH
UP
36" CLEAT P/S

MAIN DECK

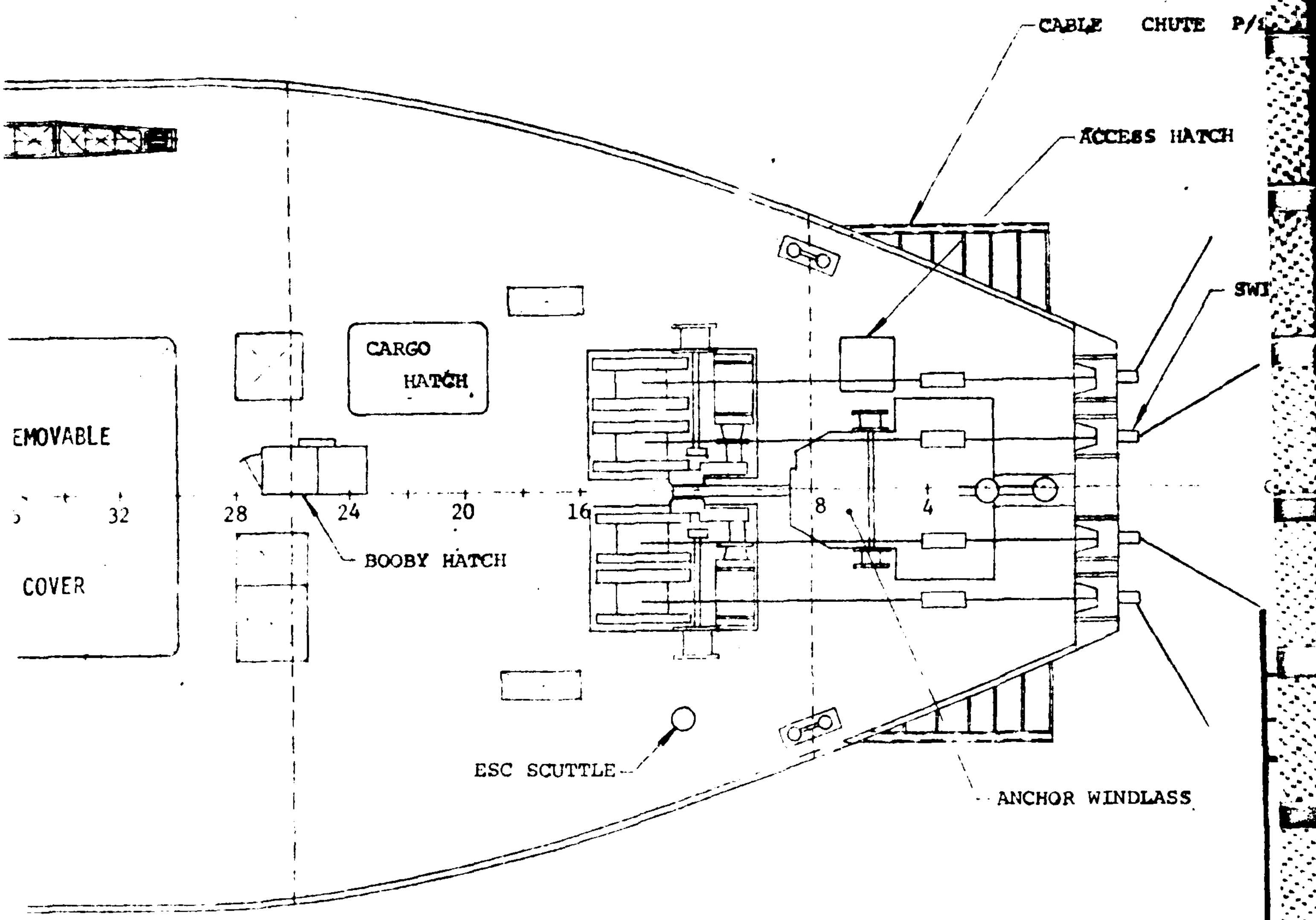


EVOLVING CRANE
20 TON REVOLVING CRANE
HATCH
BOOBY HATCH P/S
REMOVABLE HATCH COVER
FLUSH REMOVABLE HATCH COVER
68 64 60 56 52 48 44 40 36 32 28
ESC SCUTTLE
36" CLEAT P/S

MAIN DECK

RESERVAT

THIS DRA



	NO REQ'D	NEXT ASSEMBLY
		ALTERATION
		DATE
		SHIPYARD
		LOS ANGELES
		TECHNICAL SERVICES
		PURCHASING
		ESTIMATING
		USCG
		ABS

RESERVATION

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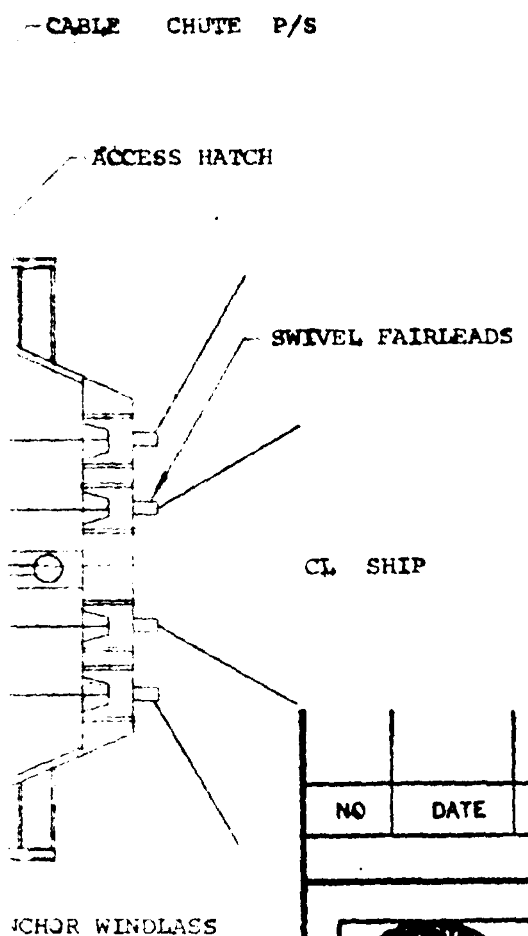

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NEXT ASSEMBLY
ALTERATION DATE
SHIPYARD
LOS ANGELES
TECHNICAL SERVICES
PURCHASING
ESTIMATING
USCG
ABS

NAVFAC (FPO-1)

WEST COAST OCEAN CONSTRUCTION PLATFORM COMMERCIAL HULL CONVERSION

		DATES
ENGR.	LCS	
DFT.	EES	
CHK.	LCS	4/78
APPR.	[illegible]	5/11/78
REL.	[illegible]	6/14/78

SCALE: 3/32" = 1' 0"

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16"
DECIMAL .00 = ± .03, .000 = ± .010
ANGULAR ± 1/2°

JOB AUTH.	DWG. NO.		ALT
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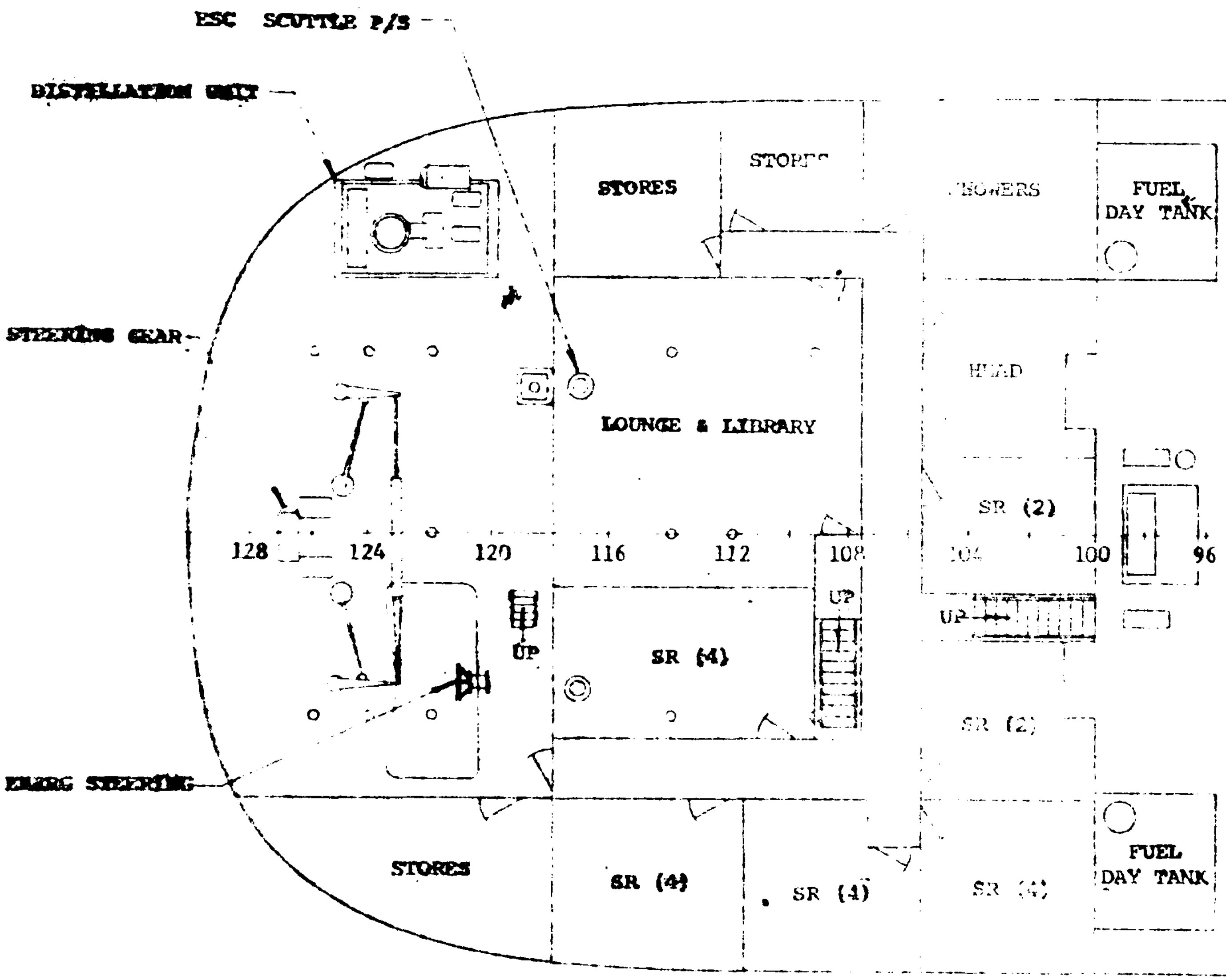
(12)

SHEET 2

(1)



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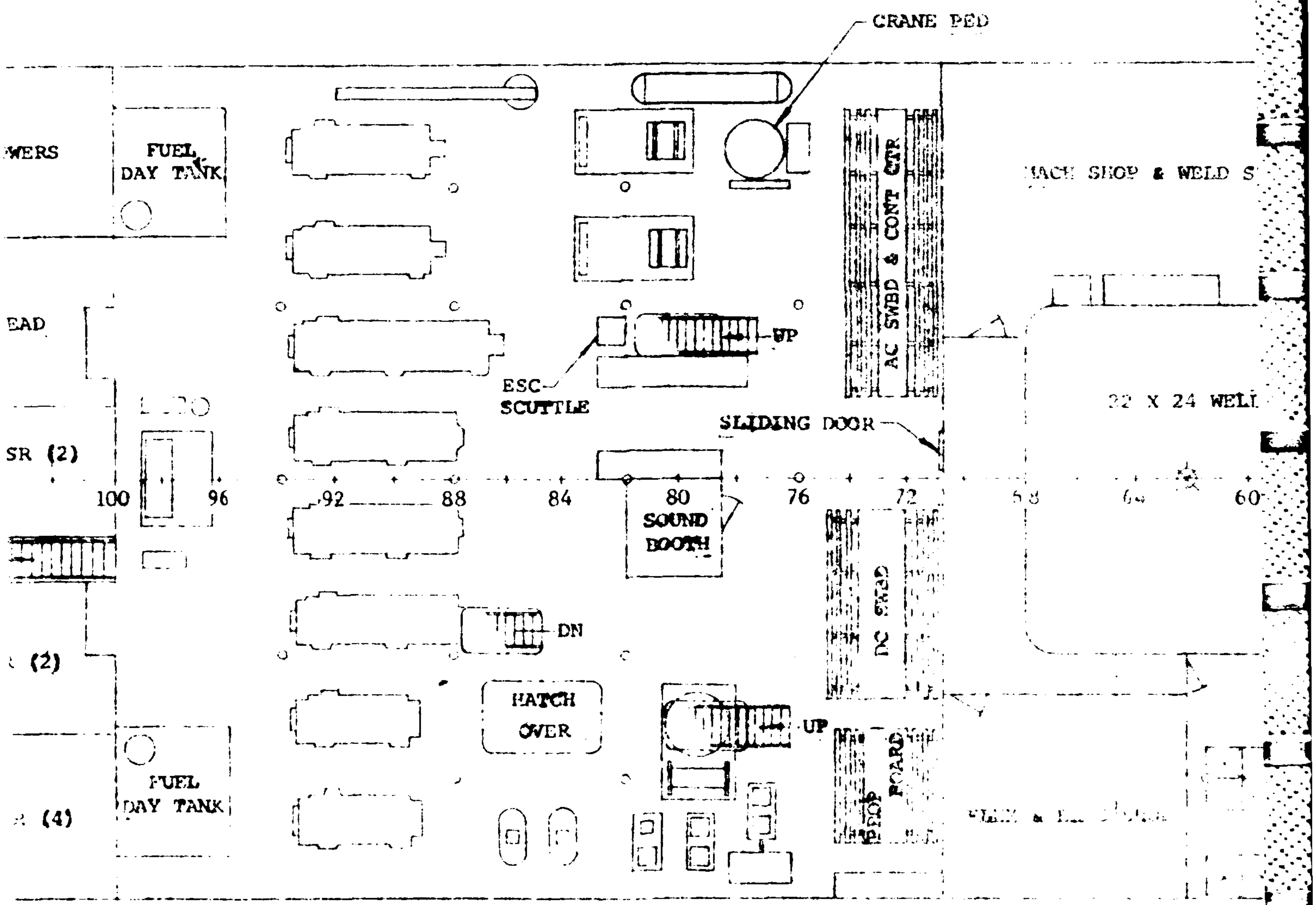
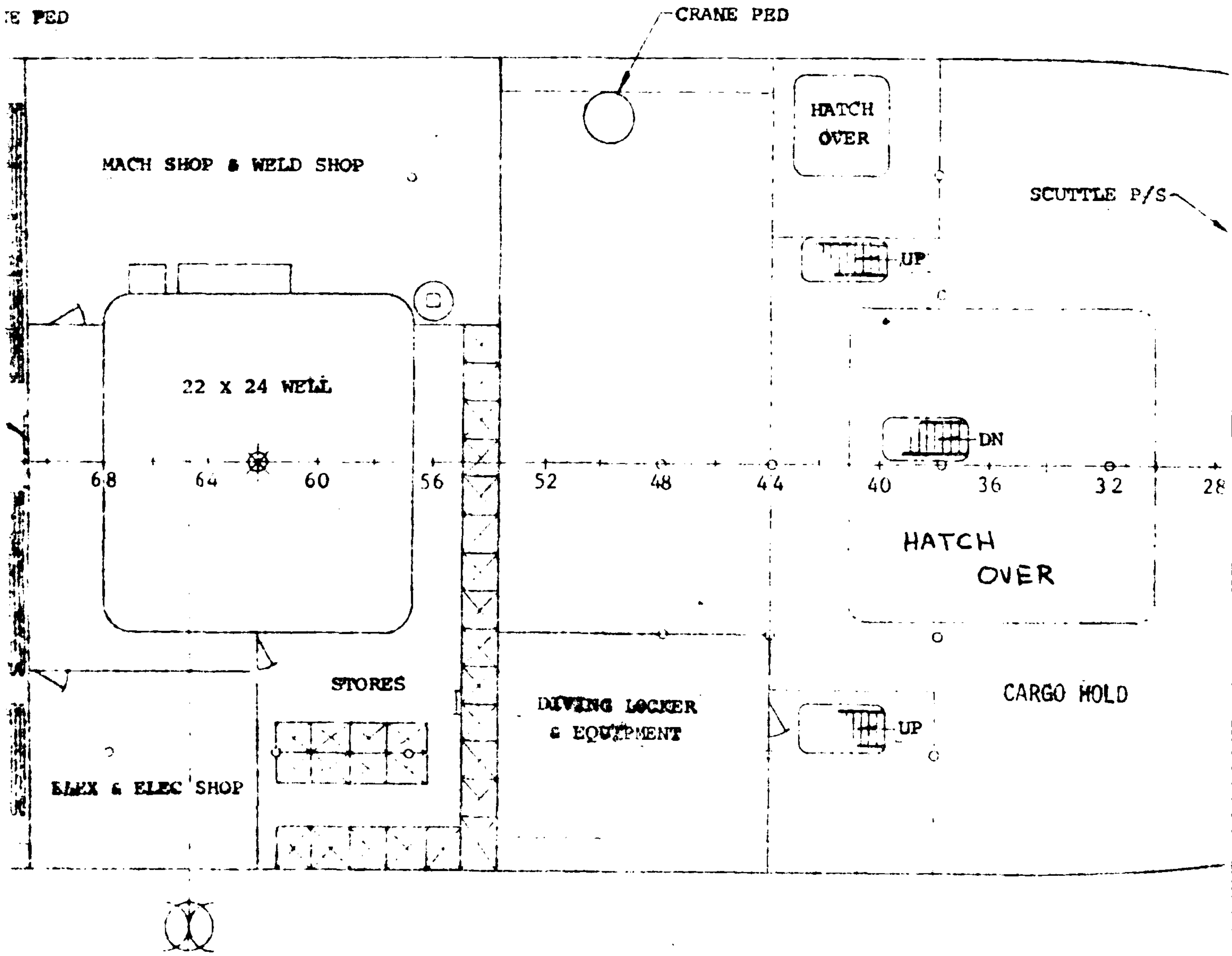
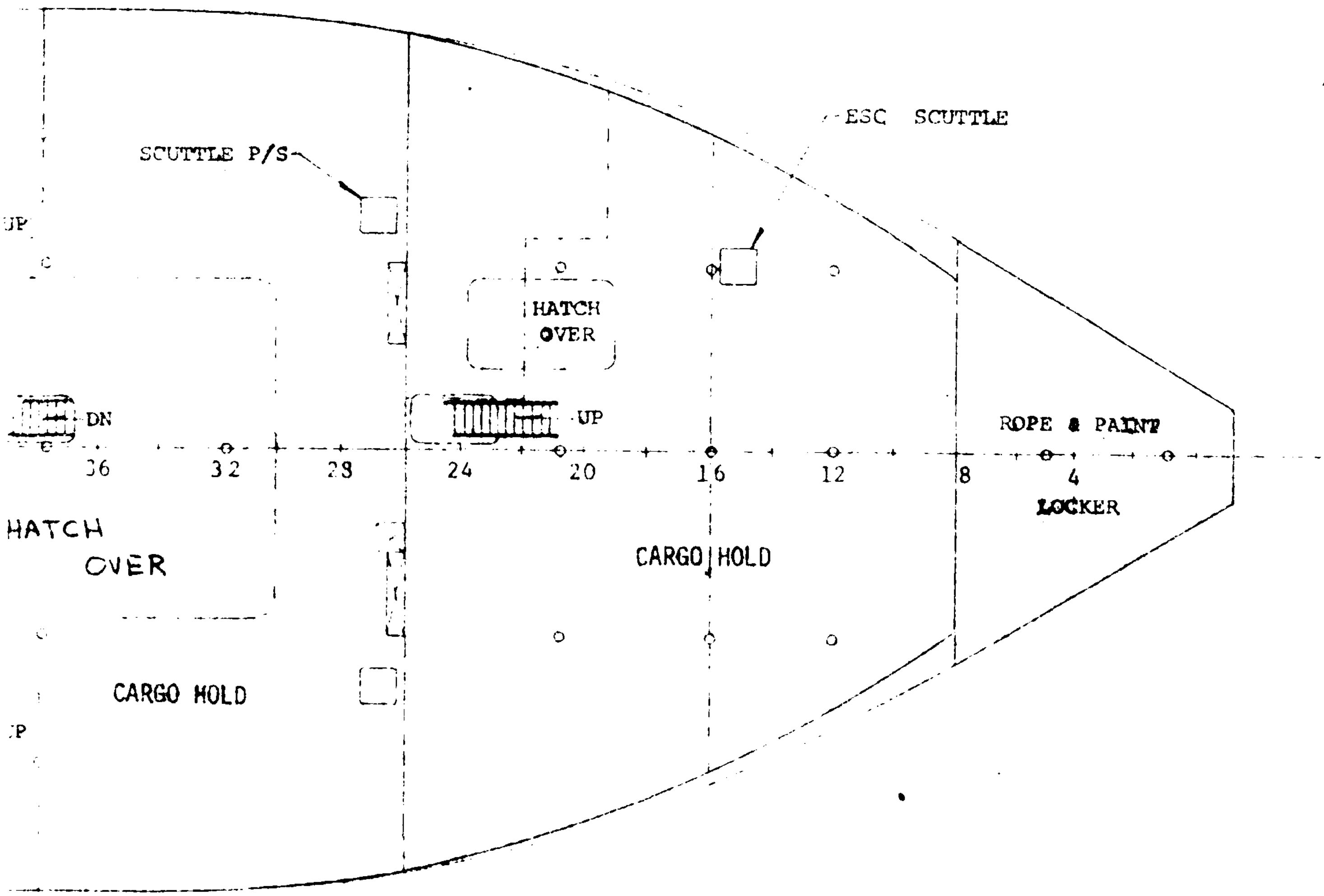

CRANE PED
WERS
FUEL DAY TANK
EAD
AC SWBD & CONT CTR
UP
ESC SCUTTLE
SLIDING DOOR
SR (2)
100
96
92
88
84
80
76
72
60
SOUND BOOTH
DC SWBD
DN
(2)
HATCH OVER
UP
BOARD
FUEL DAY TANK
(4)
32 X 24 WELL

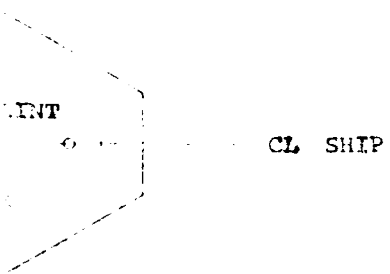
SECOND DECK

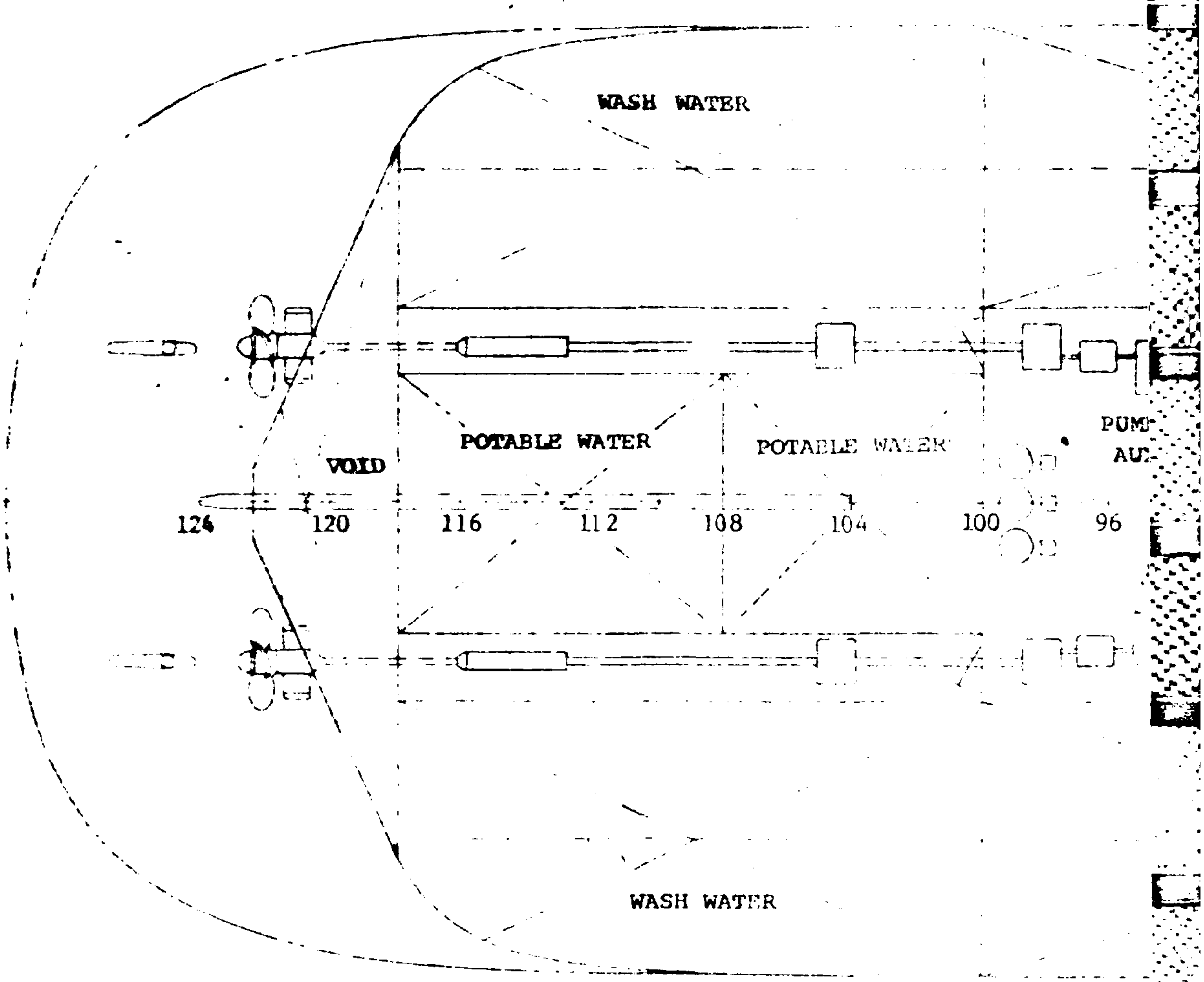

CRANE PED
HATCH OVER
MACH SHOP & WELD SHOP
SCUTTLE P/S
UP
22 X 24 WELL
DN
68
64
60
56
52
48
44
40
36
32
28
HATCH OVER
STORES
DIVING LOCKER & EQUIPMENT
CARGO HOLD
UP
ELEX & ELEC SHOP

SECOND DECK


SCUTTLE P/S
ESC SCUTTLE
HATCH
OVER
DN
UP
ROPE & PAINT
LOCKER
36
32
28
24
20
16
12
8
4
HATCH
OVER
CARGO HOLD
CARGO HOLD

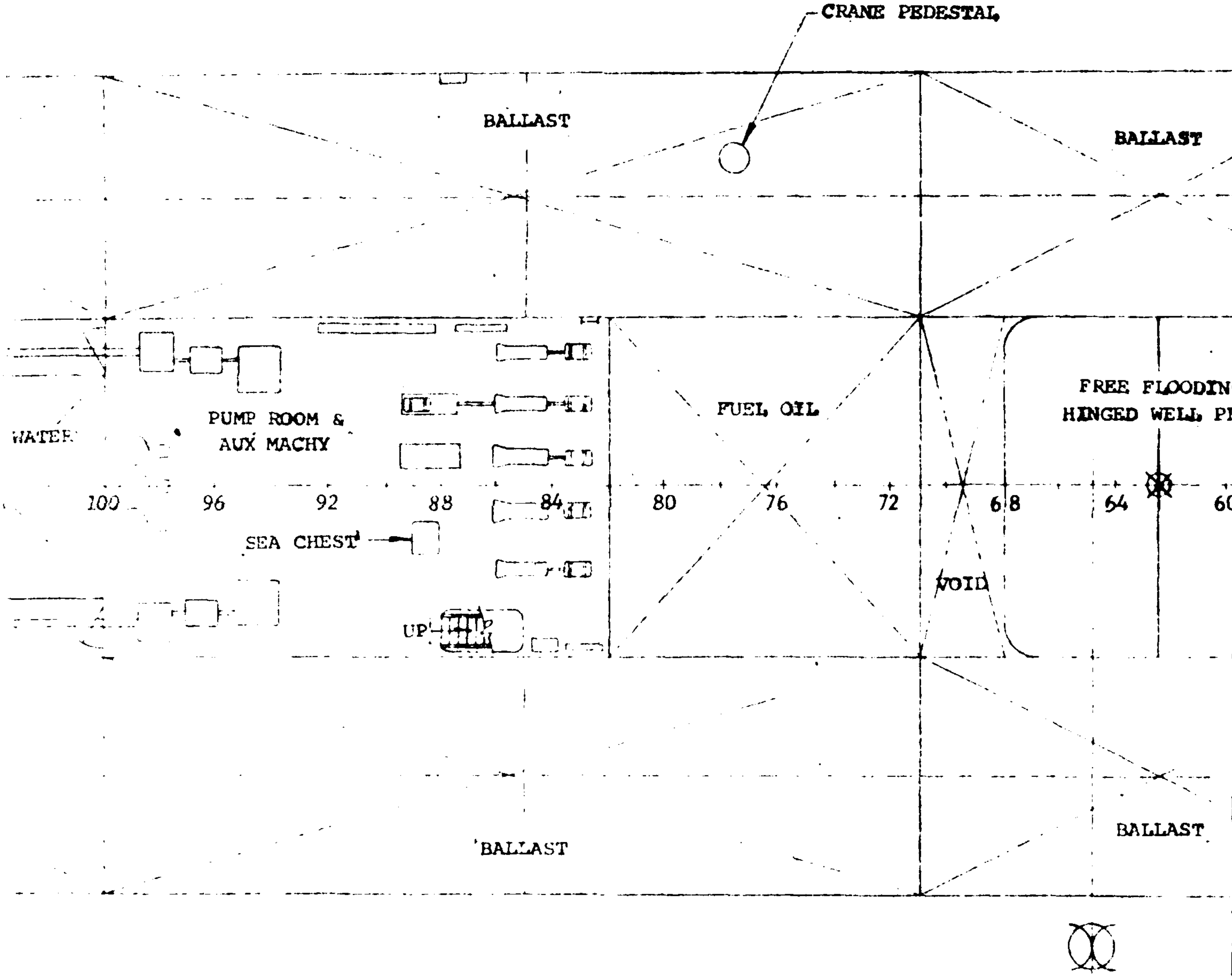
3




WASH WATER
POTABLE WATER
POTABLE WATER
VOID
PUM
AU
124
120
116
112
108
104
100
96
WASH WATER

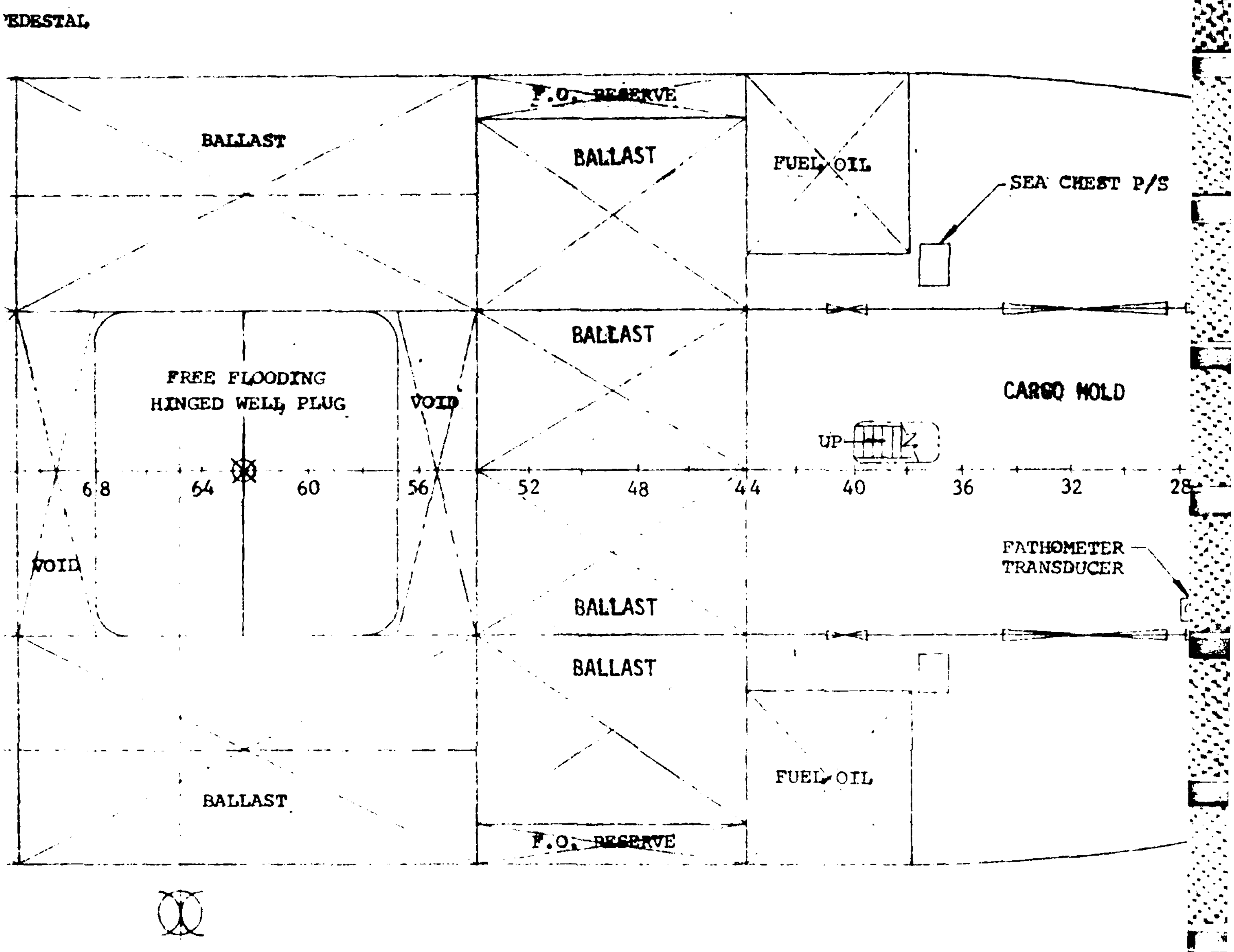
C

SECOND DECK

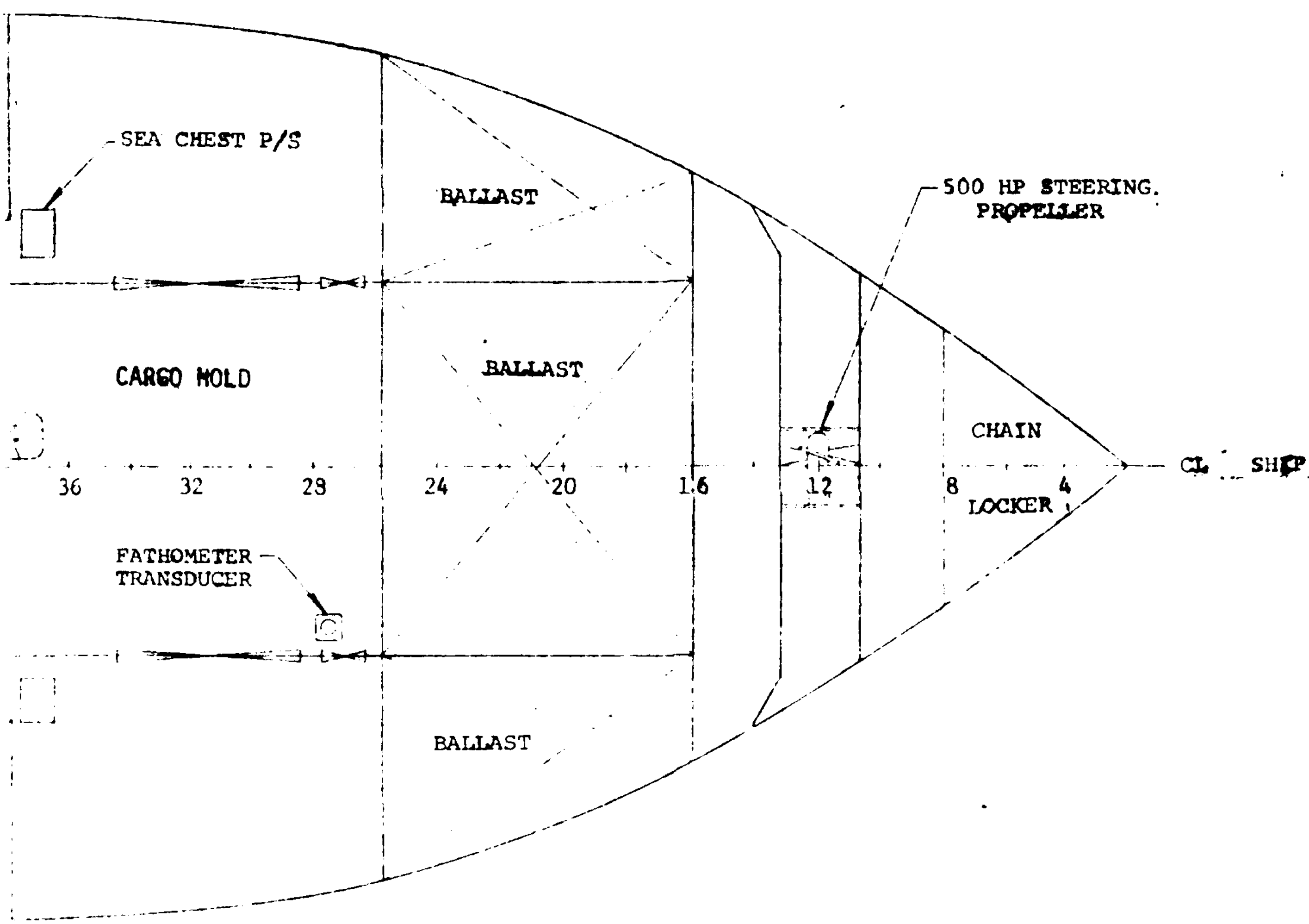


HOLD

SECOND DECK



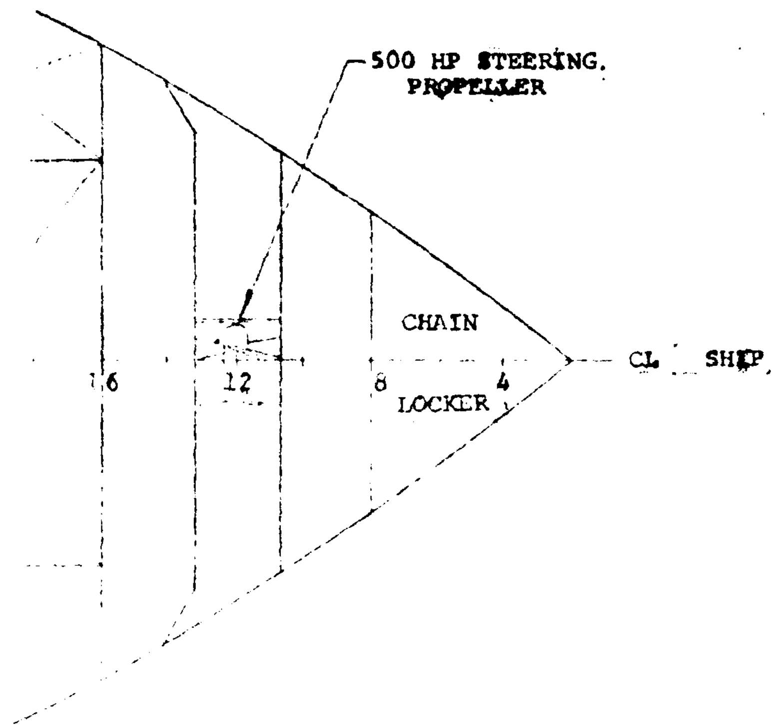
HOLD



	NO REQ'D		NEXT ASSEMBLY
			ALTERATION
			DATE
			SHIPYARD
			LOS ANGELES
			TECHNICAL SERVIC
			PURCHASING
			ESTIMATING
			USCG
			ABS

9

THIS DRAWIN ... ING ONLY



NO	DATE	DE
		ALTERATI

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	NO REQD		NEXT ASSEMBLY
			ALTERATION
			DATE
			SHIPYARD
			LOS ANGELES
			TECHNICAL SERVICES
			PURCHASING
			ESTIMATING
			USCG
			ABS

NAVFAC (

WEST COAST OCEAN CO

COMMERCIAL HE

	DATES
ENGR.	
DFT. EES	
CHK.	
APPR.	

SCALE: 1/2" = 1'-0"

JOB AUTH. 64072-

16

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NO	DATE	BY	DESCRIPTION	APPROVED

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NAVFAC (FPO-1)

WEST COAST OCEAN CONSTRUCTION PLATFORM COMMERCIAL HULL CONVERSION

	DATES
ENGR.	
DFT. EES	
CHKD.	
APPR.	
REL.	

SCALE: 3/32" = 1'-0"

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16"
DECIMAL .00 ± [illegible] .000 ± [illegible]
ANGULAR ± ½°

JOB AUTH 04072-010000

DWG. NO. D • 04072 • A001

SHEET 3

11

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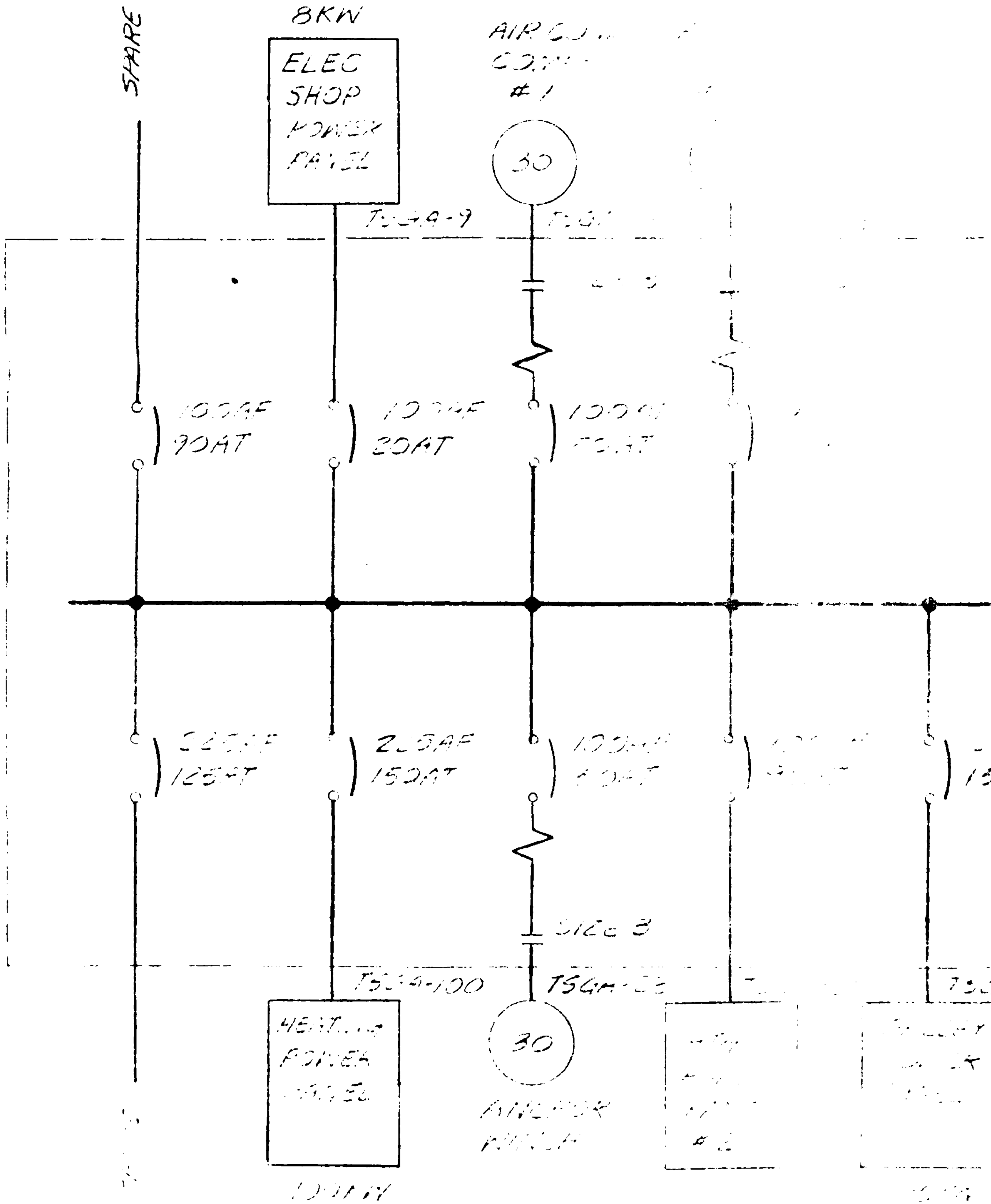
1



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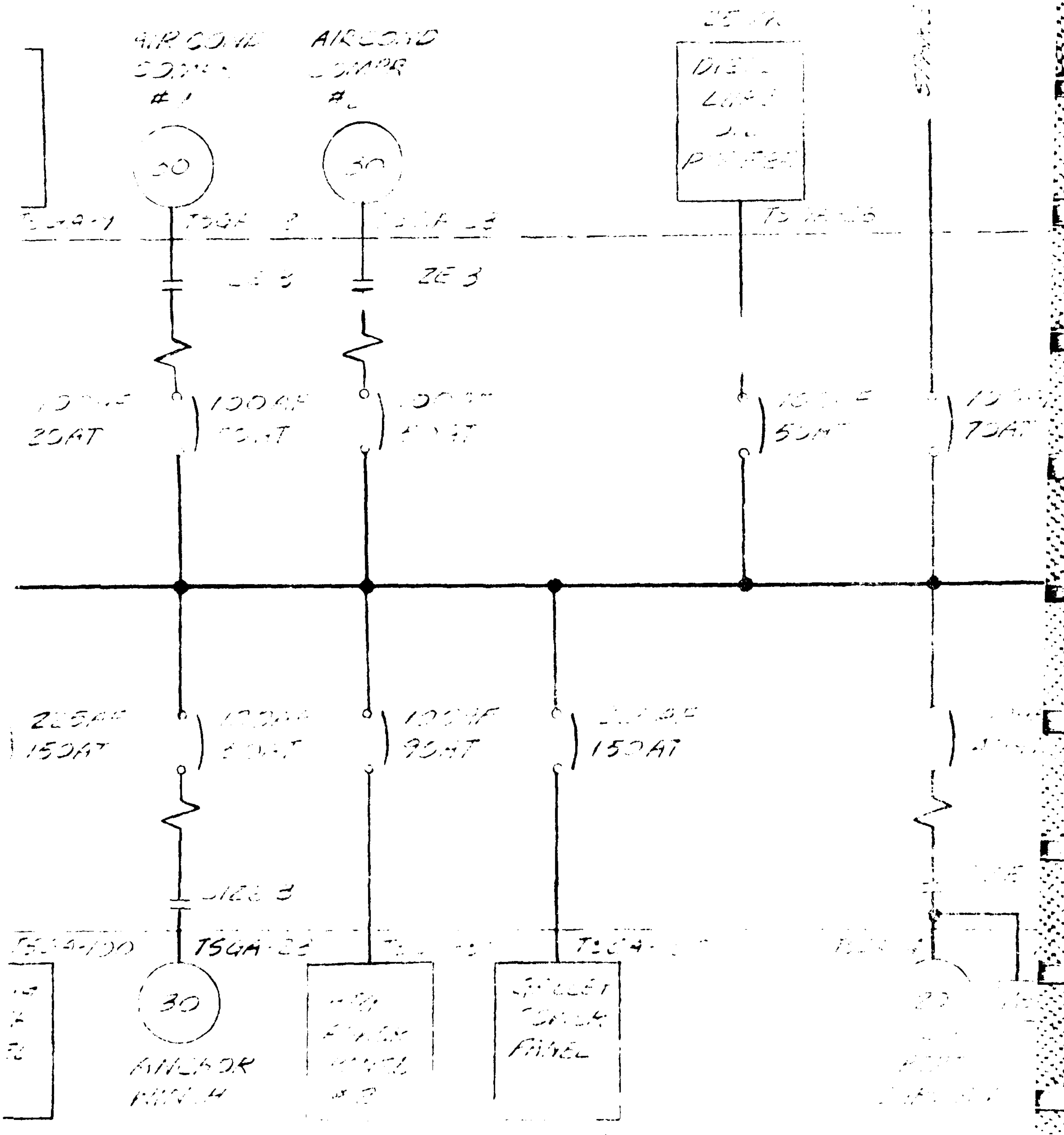
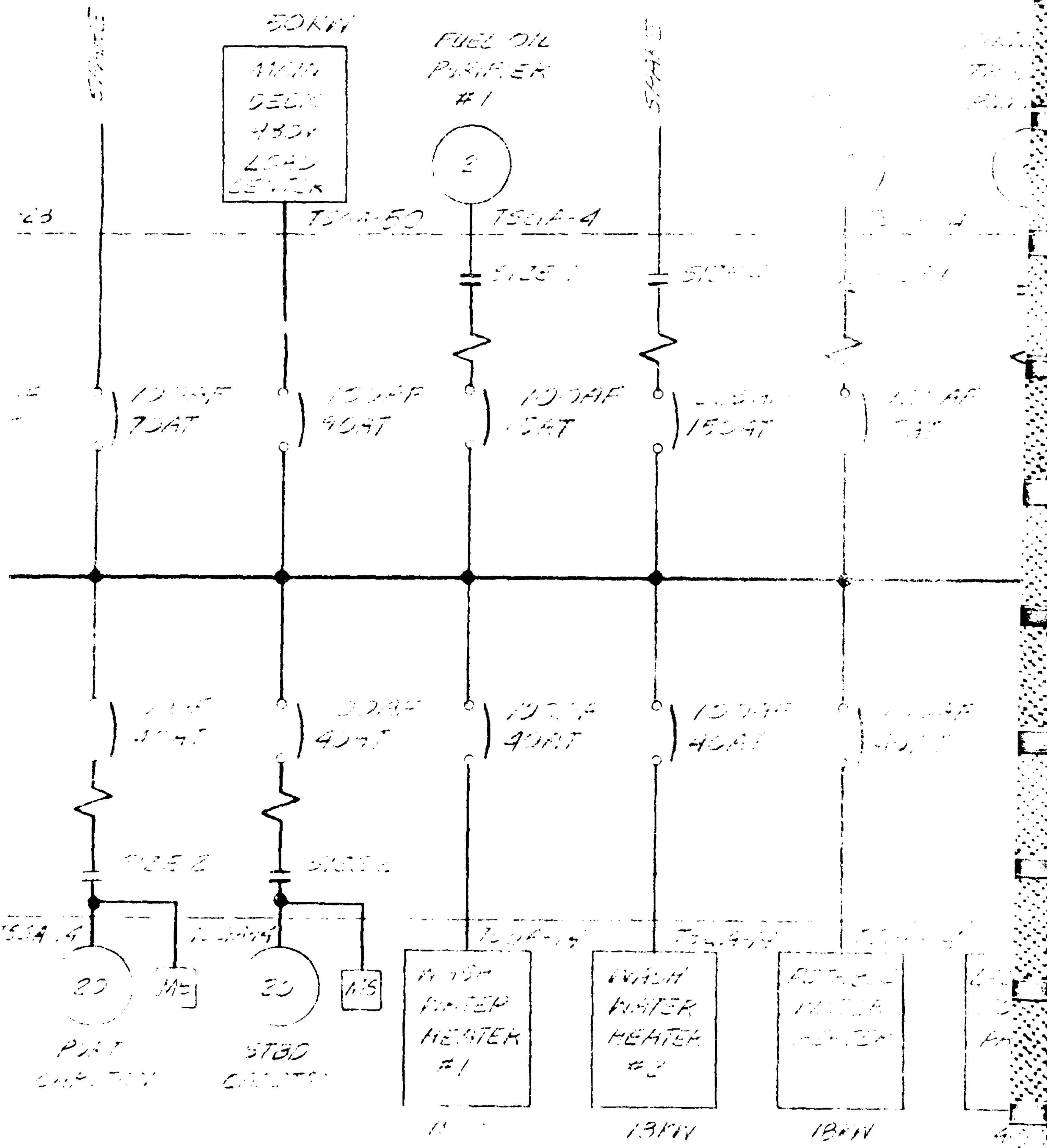
best available copy.

(2)

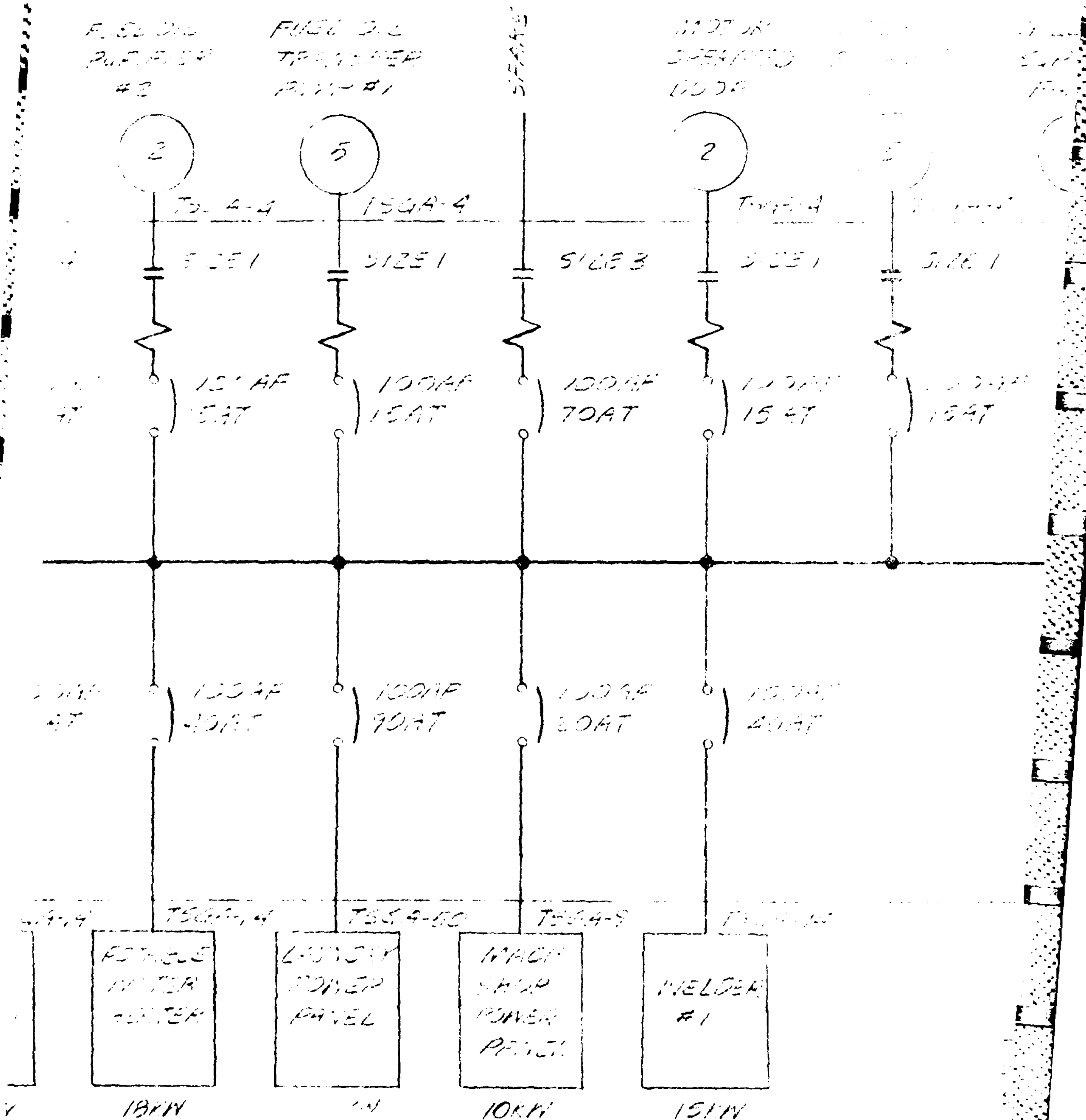

AIR COND COMPR #2
30
30
ZE 3
100AF
20AT
150AT
30
TSGA-100
TSGA
ANCHOR
PANEL

(3)

SHIP'S SERVICE MCC

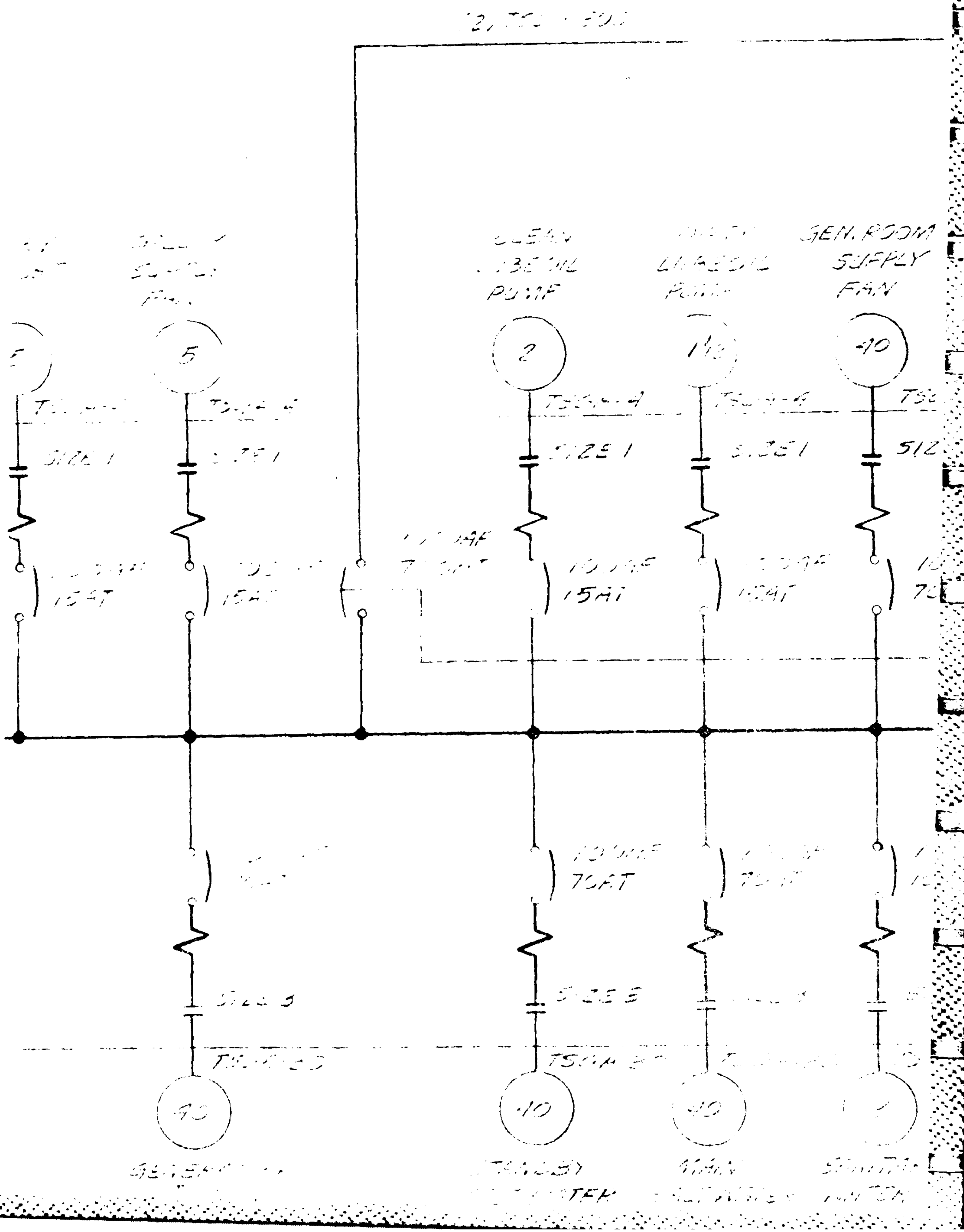


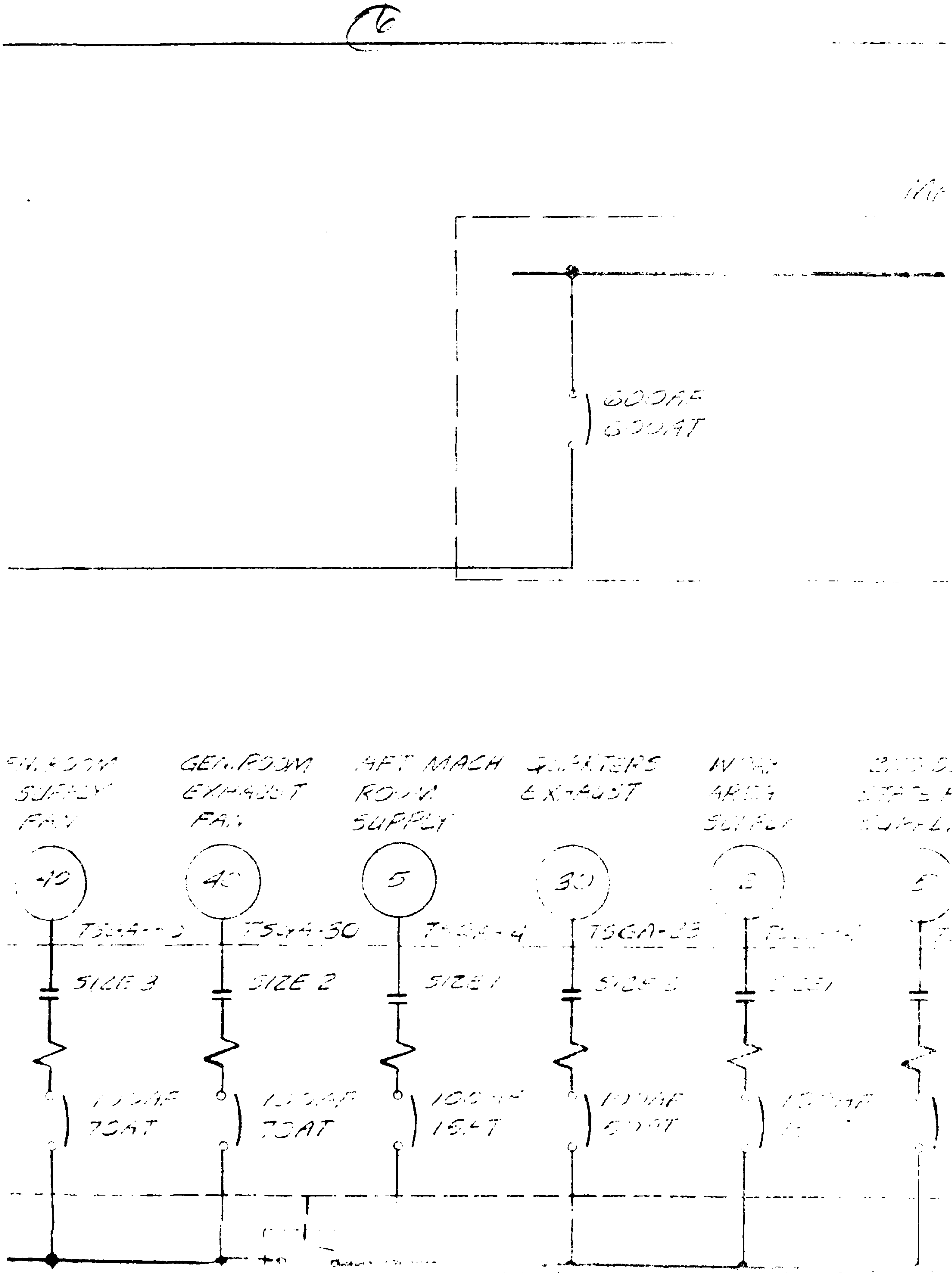
4

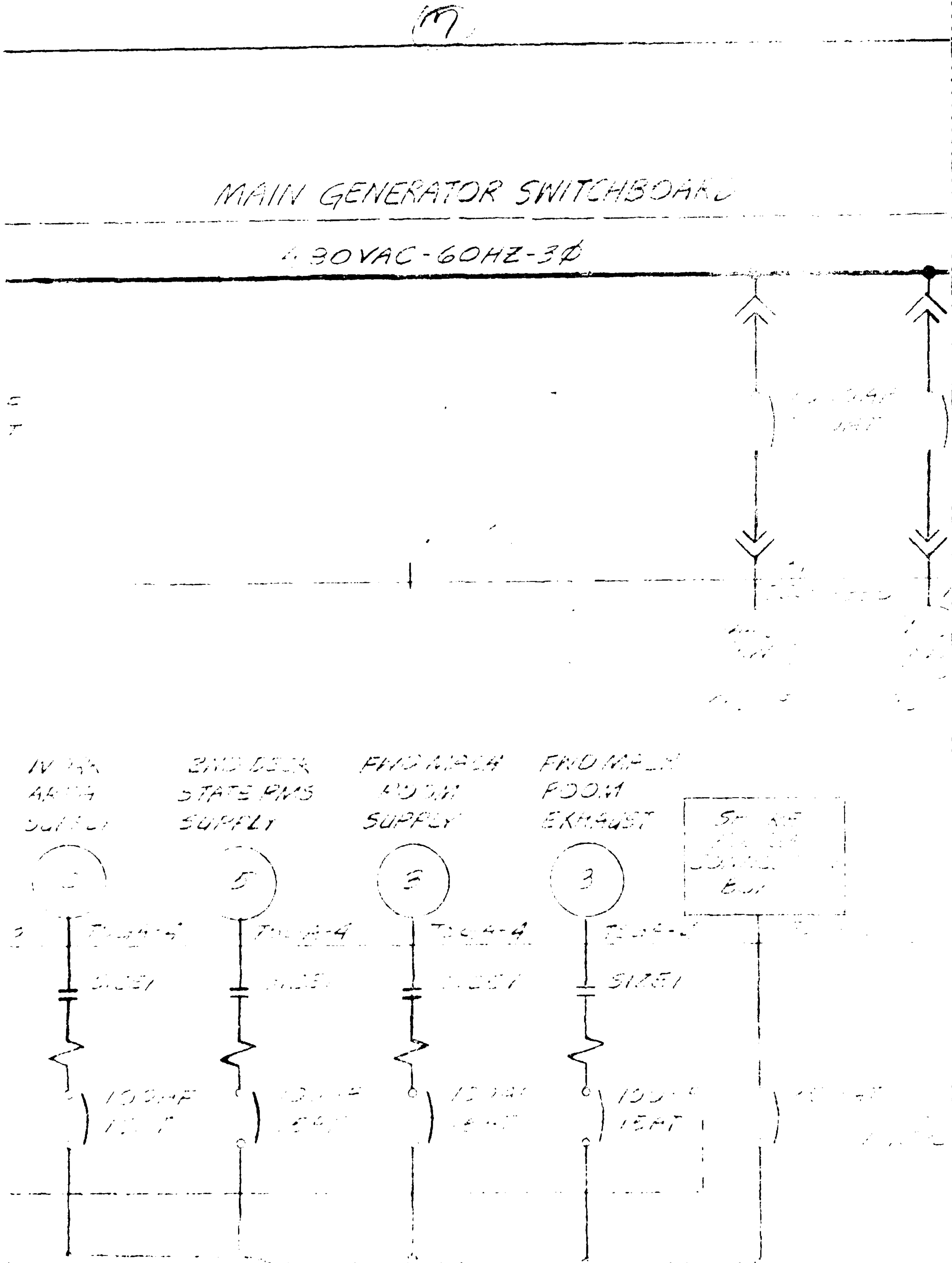


SPARE
TSGA-4
SIZE 1
SIZE 3
100AF
15AT
70AT
15AT
100AF
90AT
40AT
WELDER
#1
PANEL
18KW
10KW
15KW

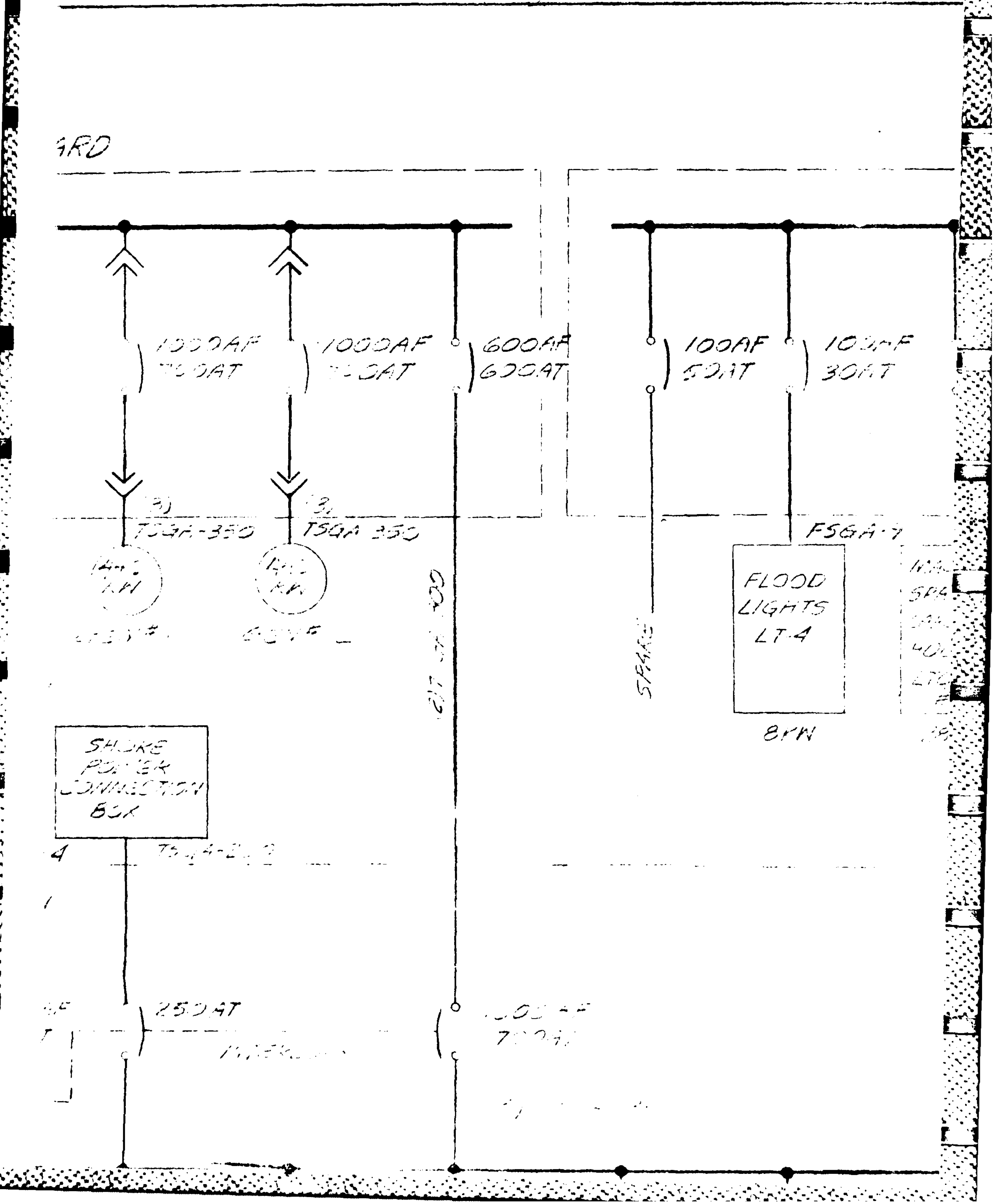
5



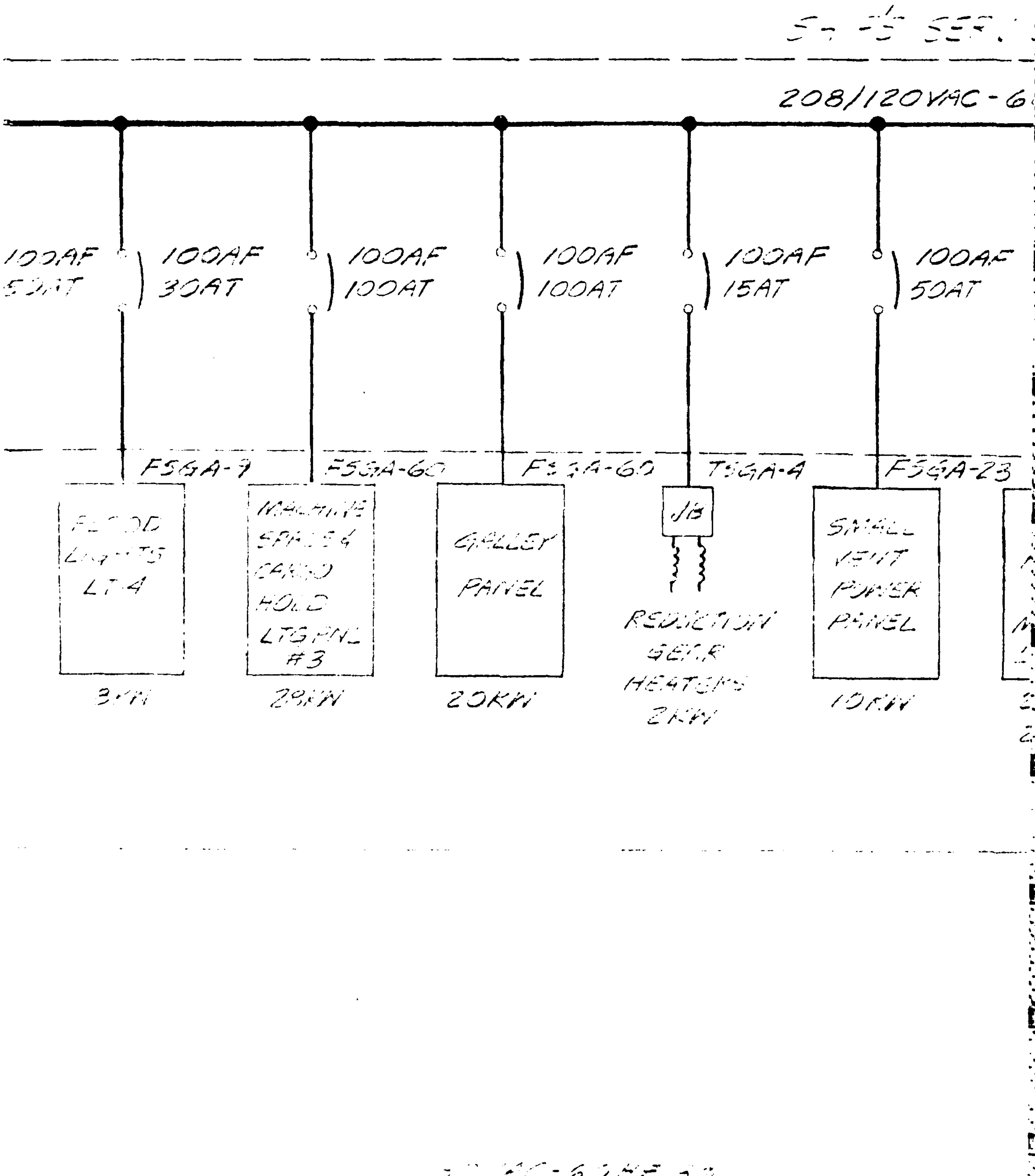

600AF
600AT
GEN.ROOM
EXHAUST
FAN
AFT MACH
ROOM
SUPPLY
EXHAUST
40
5
30
TSGA-30
SIZE 3
SIZE 2
SIZE 1
70AT


MAIN GENERATOR SWITCHBOARD
430VAC-60HZ-3Ø
2ND DECK
STATE RMS
SUPPLY
SUPPLY
FWD MACH
ROOM
EXHAUST
5
3
3
SIZE 1
1EAT

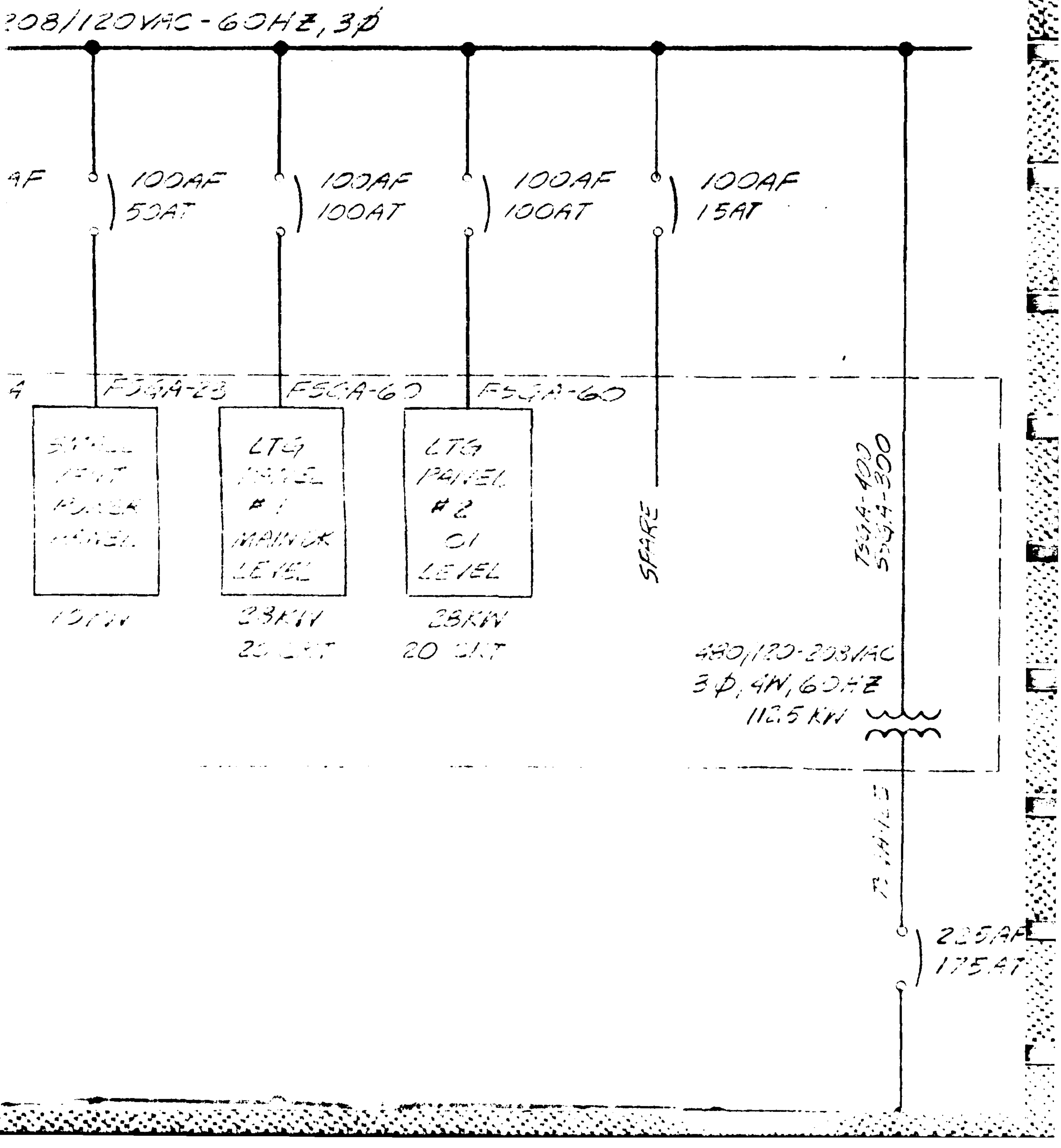
8


1000AF
600AF
600AT
100AF
50AT
30AT
TSGA-350
TSGA 350
FLOOD
LIGHTS
LT-4
8KW
SPARE
SHORE
POWER
CONNECTION
BOX
250AT

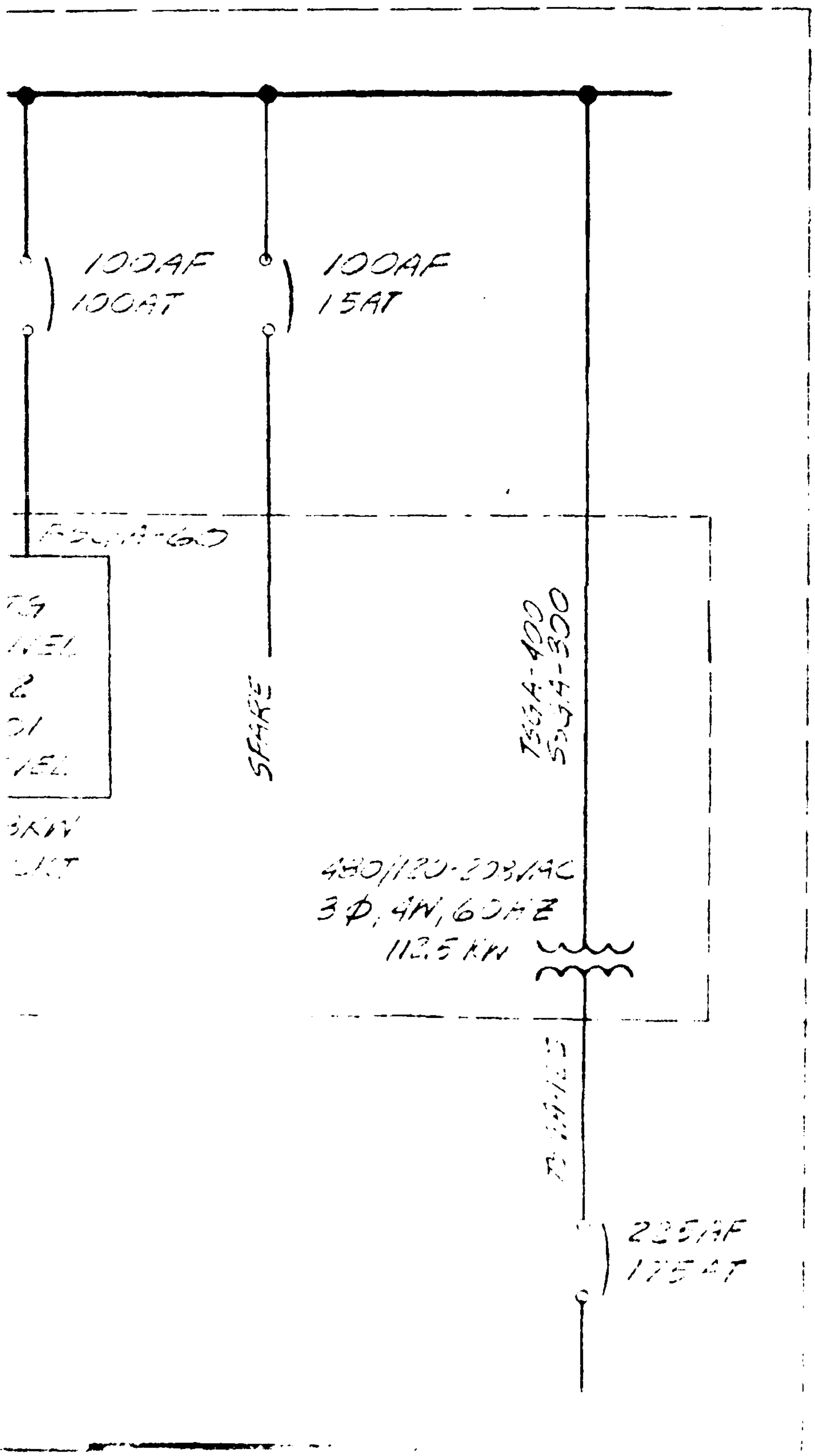
9

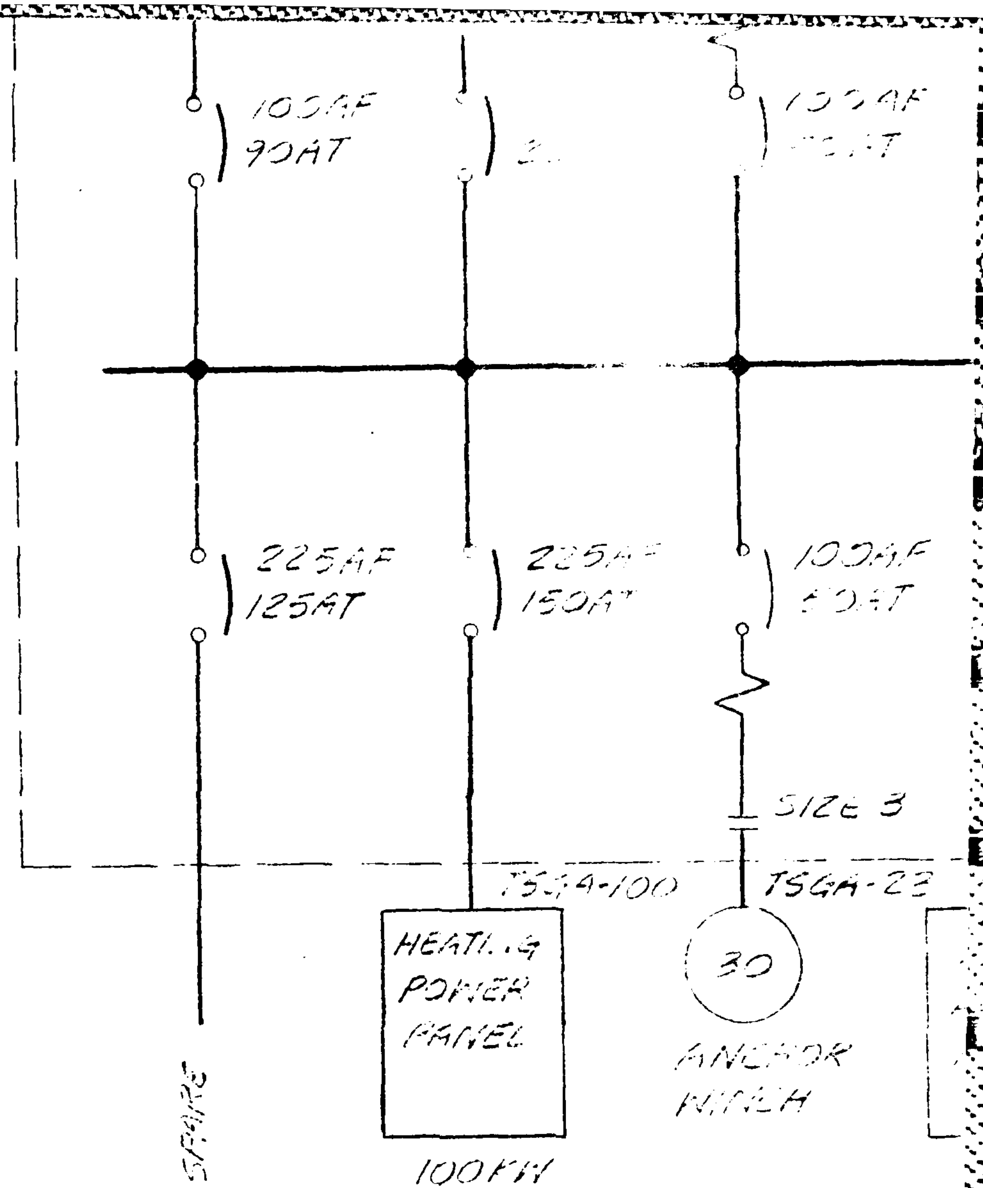

208/120VAC - 6
100AF
100AF
30AT
100AF
100AT
100AF
100AT
100AF
15AT
100AF
50AT
FSGA-9
FSGA-60
TSGA-4
FSGA-23
LT-4
LTG PNL
#3
GALLEY
PANEL
JB
HEATERS
2KW
SMALL
VENT
POWER
PANEL
20KW
10KW

SHIP'S SERVICE MCC (CONT'D)

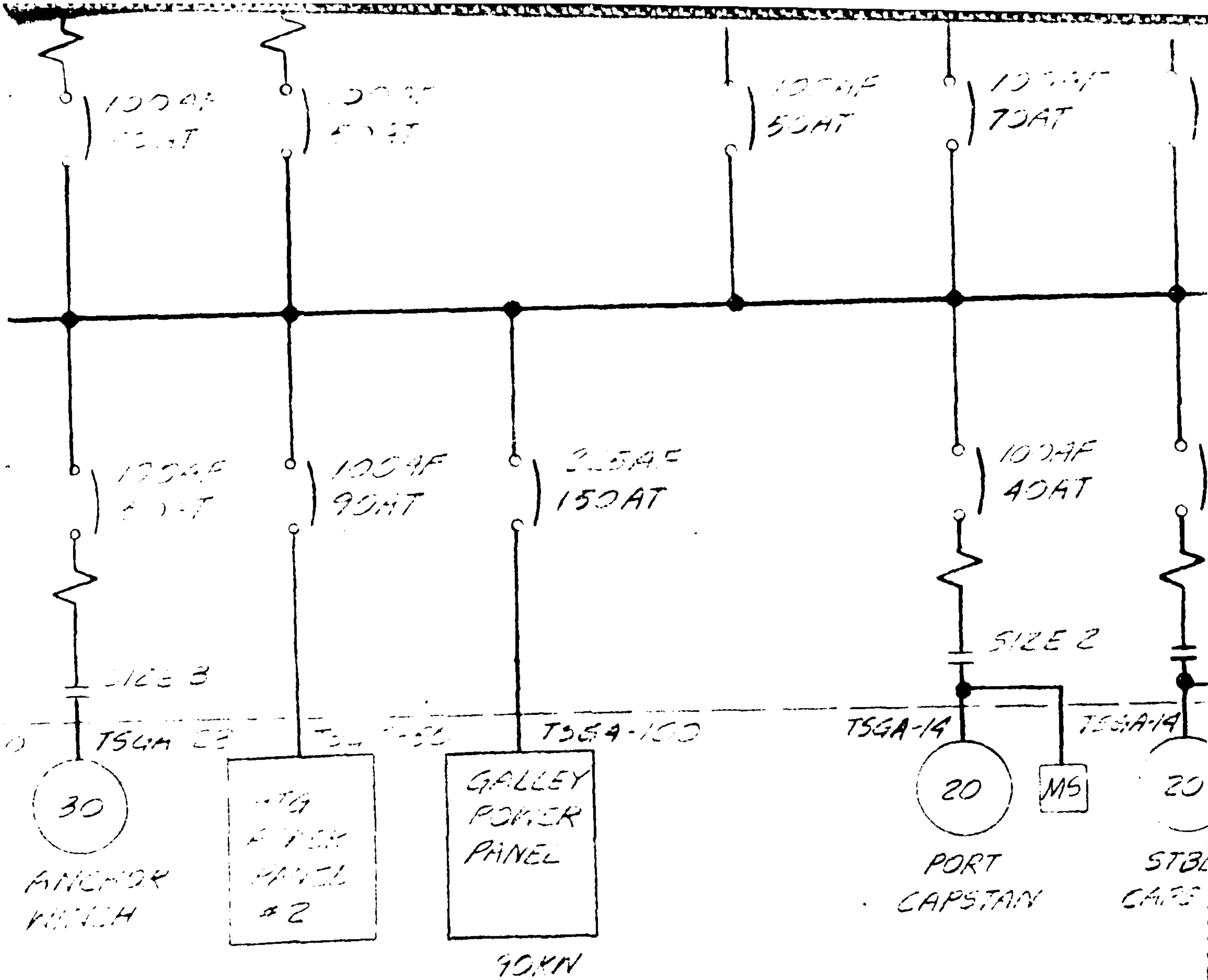


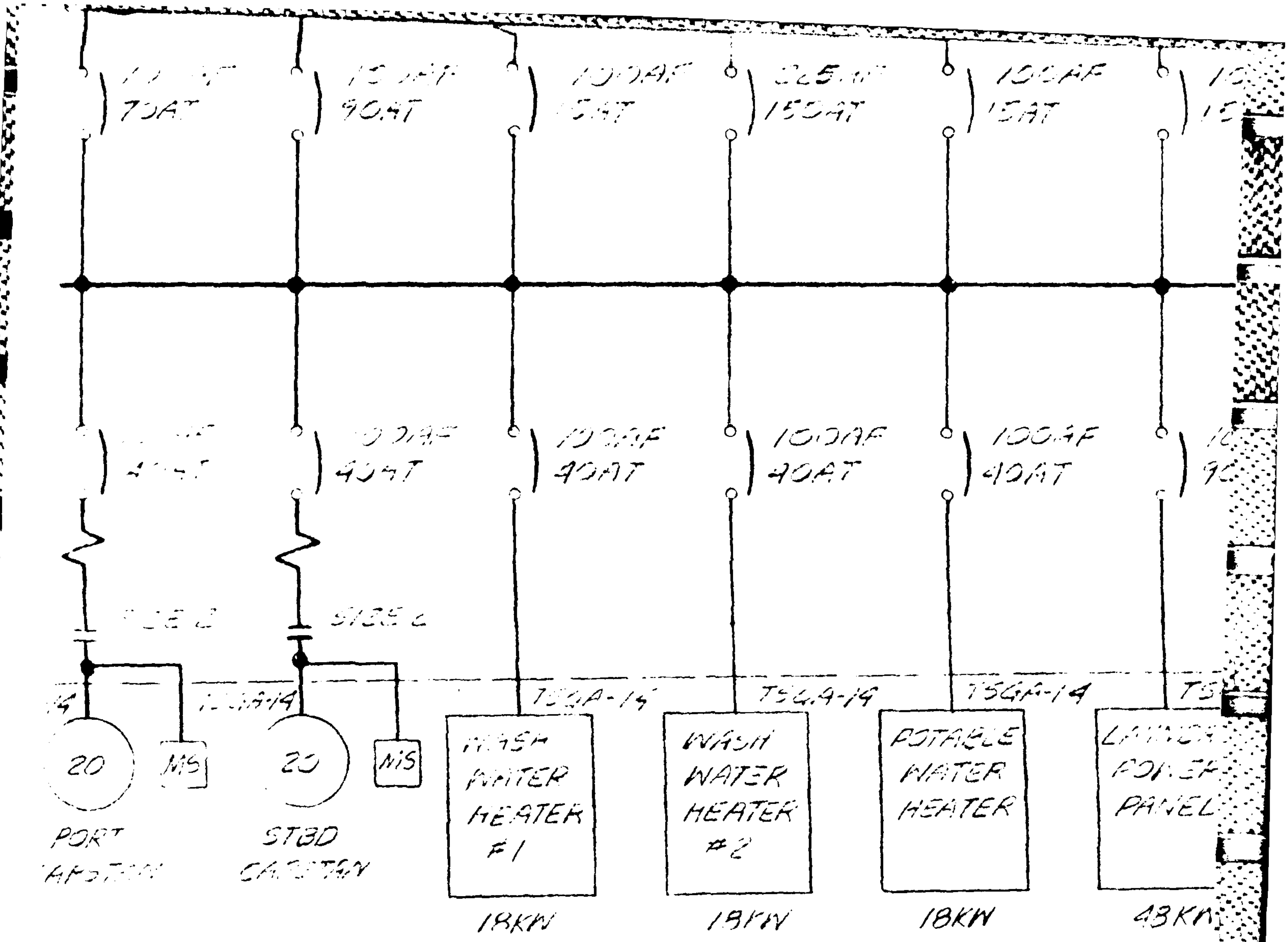
ONT'D)


100AF
100AT
100AF
15AT
SPARE
480/120-208VAC
3Φ, 4W, 60HZ
112.5 KW
225AF
175AT

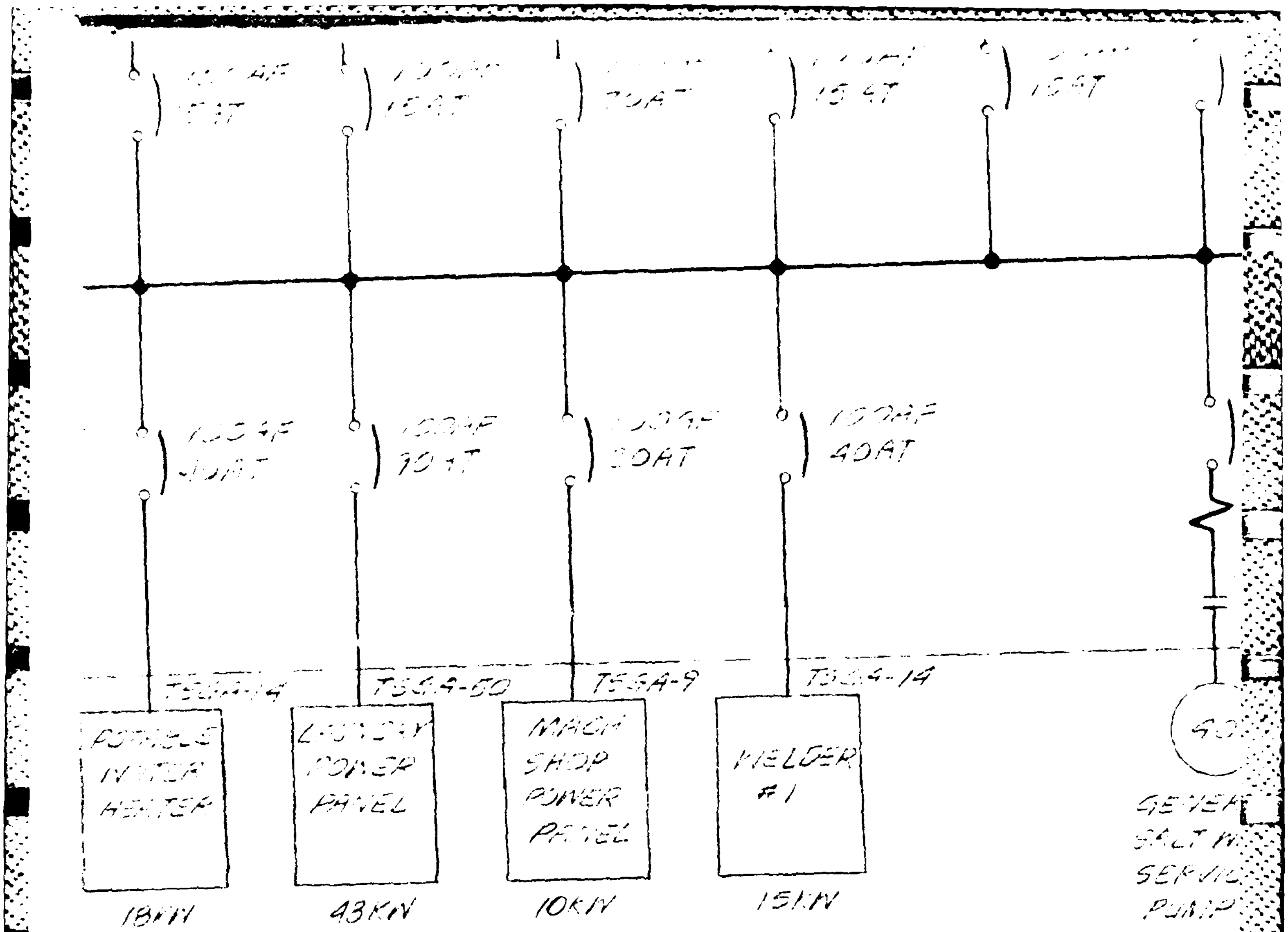

100AF
90AT
225AF
125AT
225AF
150AT
SIZE 3
HEATING
POWER
PANEL
100KW
30
ANCHOR
WINCH
SPARE

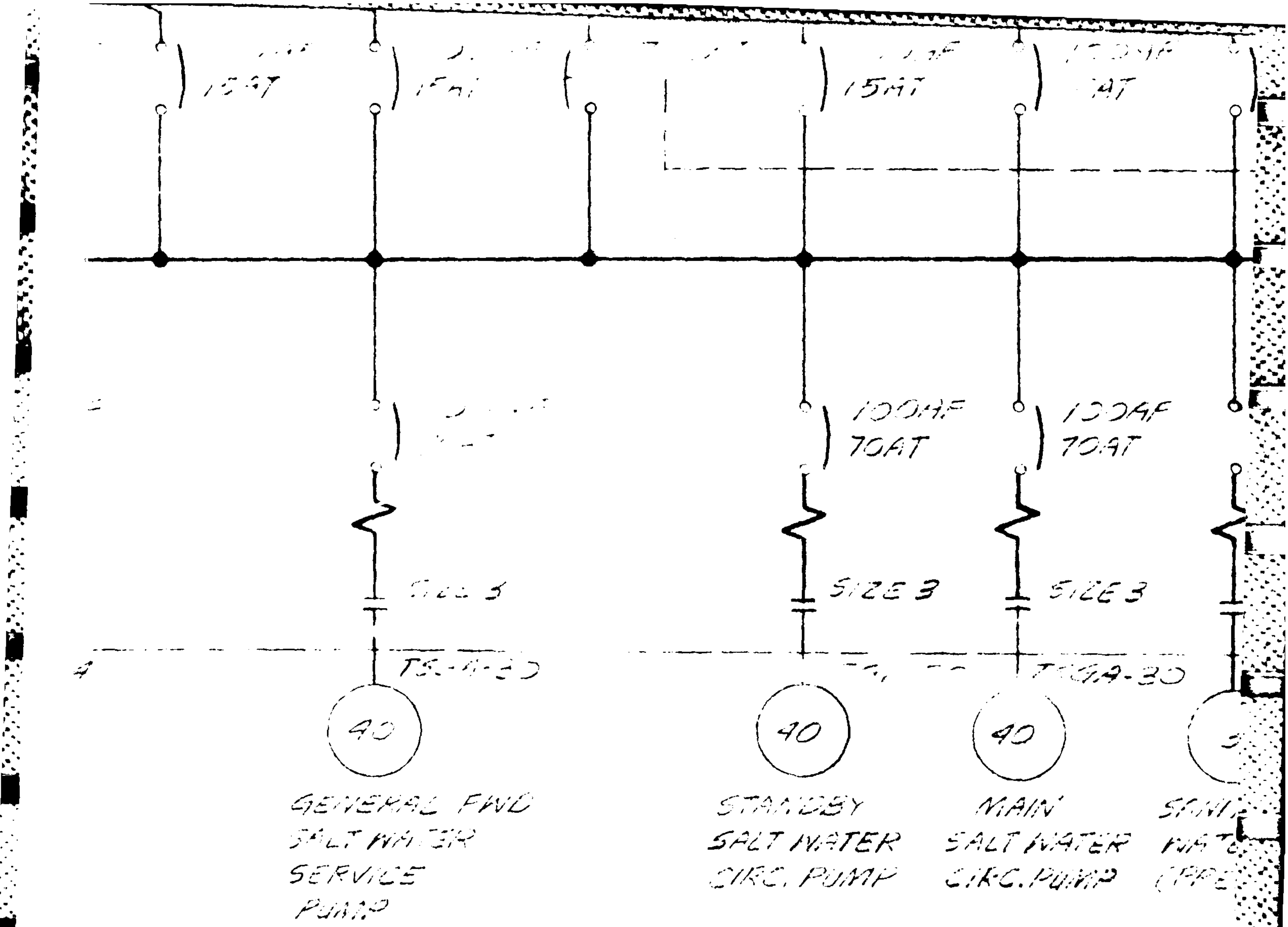
10


50AT
70AT
100AF
90AT
150AT
100AF
40AT
SIZE 2
TSGA-100
TSGA-14
30
GALLEY
POWER
PANEL
90KW
20
MS
PORT
CAPSTAN

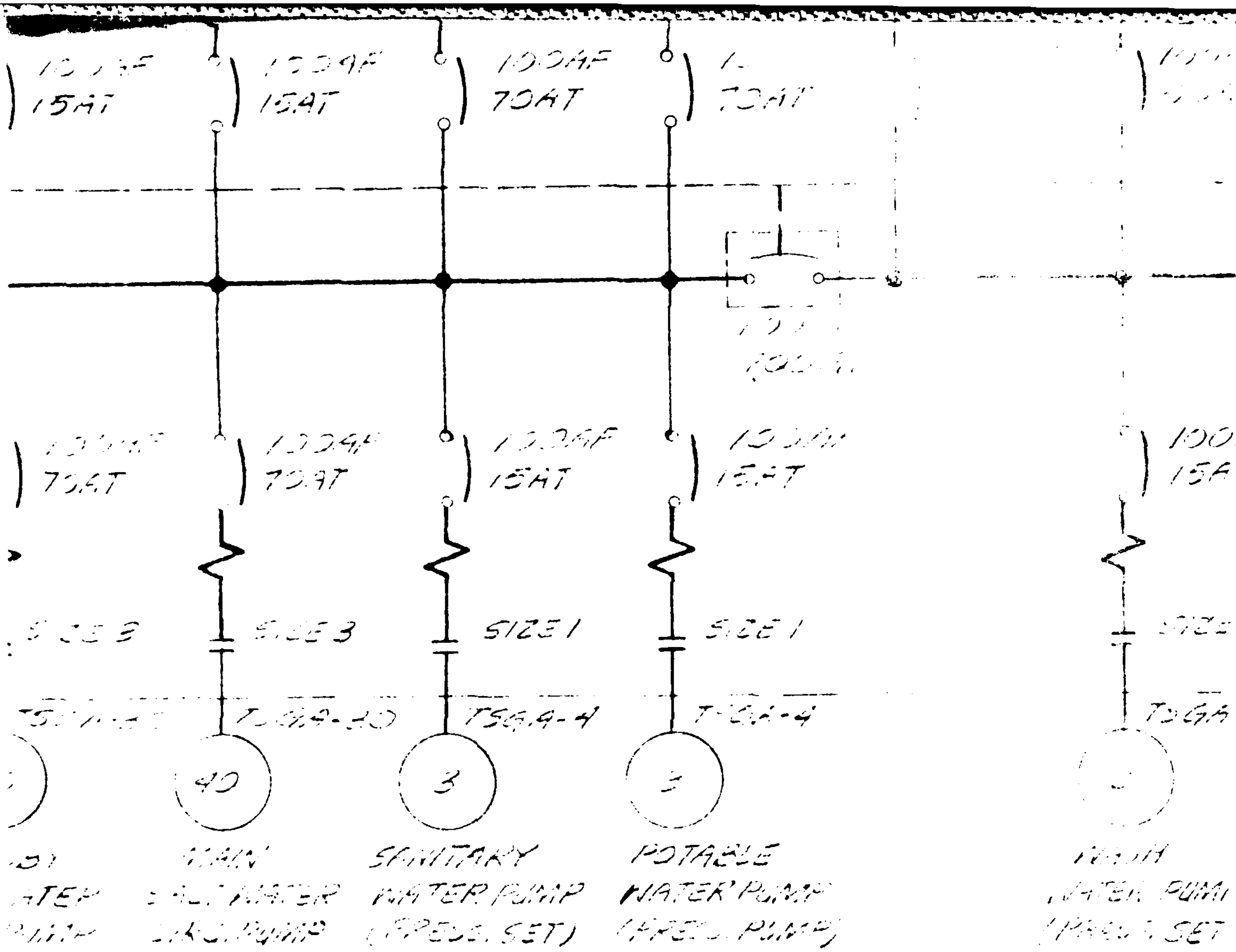


90AT
100AF
150AT
100AF
100AF
40AT
100AF
40AT
100AF
40AT
100AF
40AT
TSGA-14
TSGA-14
TSGA-14
20
MS
20
MS
PORT
STBD
WASH
WATER
HEATER
WASH WATER HEATER #2
POTABLE WATER HEATER
PANEL
18KW
18KW
18KW


100AF
40AT
TSGA-50
TSGA-9
TSGA-14
MACH
SHOP
POWER
PANEL
WELDER
#1
18KW
43KW
10KW
15KW

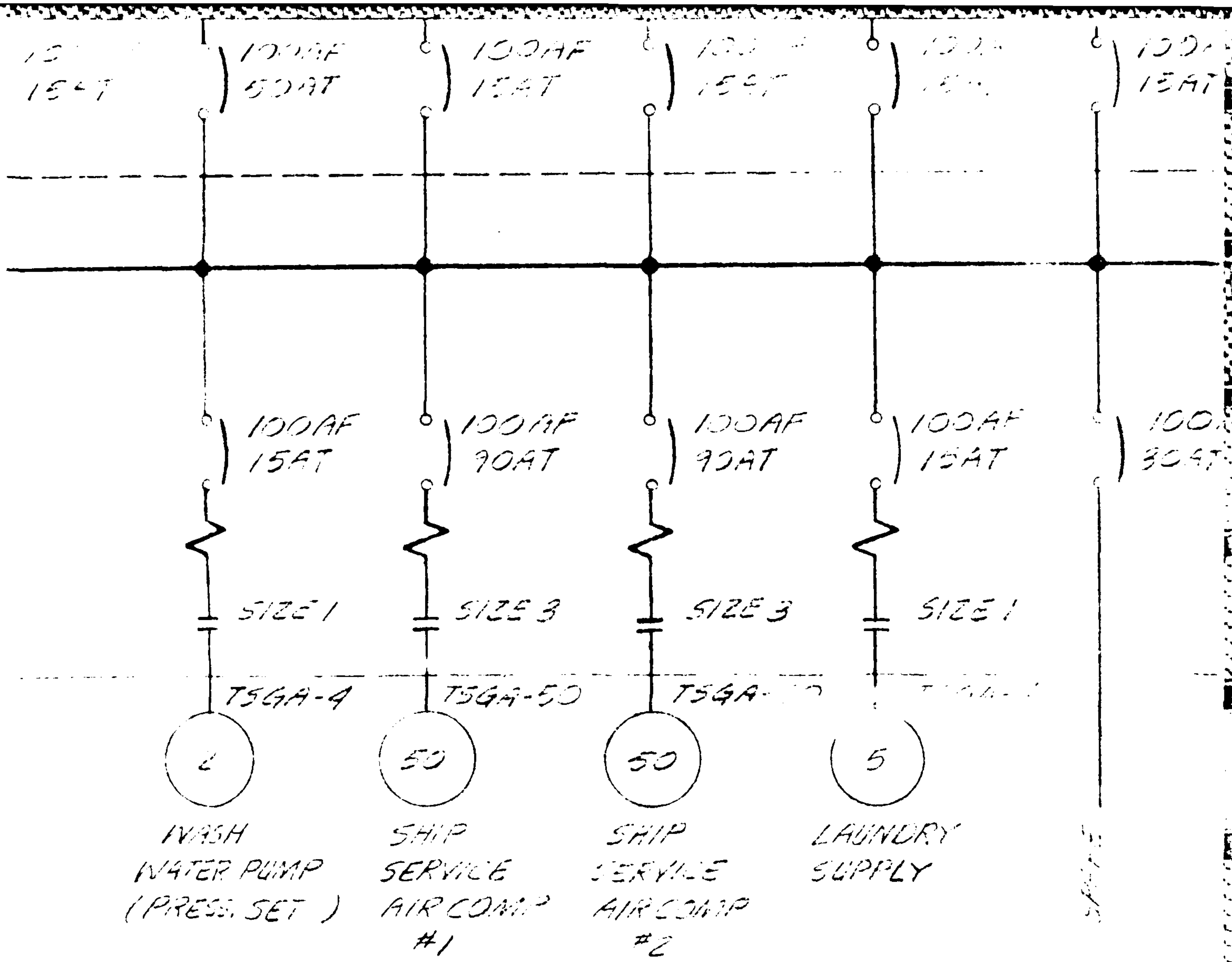

15AT
100AF
70AT
100AF
70AT
SIZE 3
SIZE 3
40
40
40
GENERAL FWD
SALT WATER
SERVICE
PUMP
STANDBY
SALT WATER
CIRC. PUMP
MAIN
SALT WATER
CIRC. PUMP

16

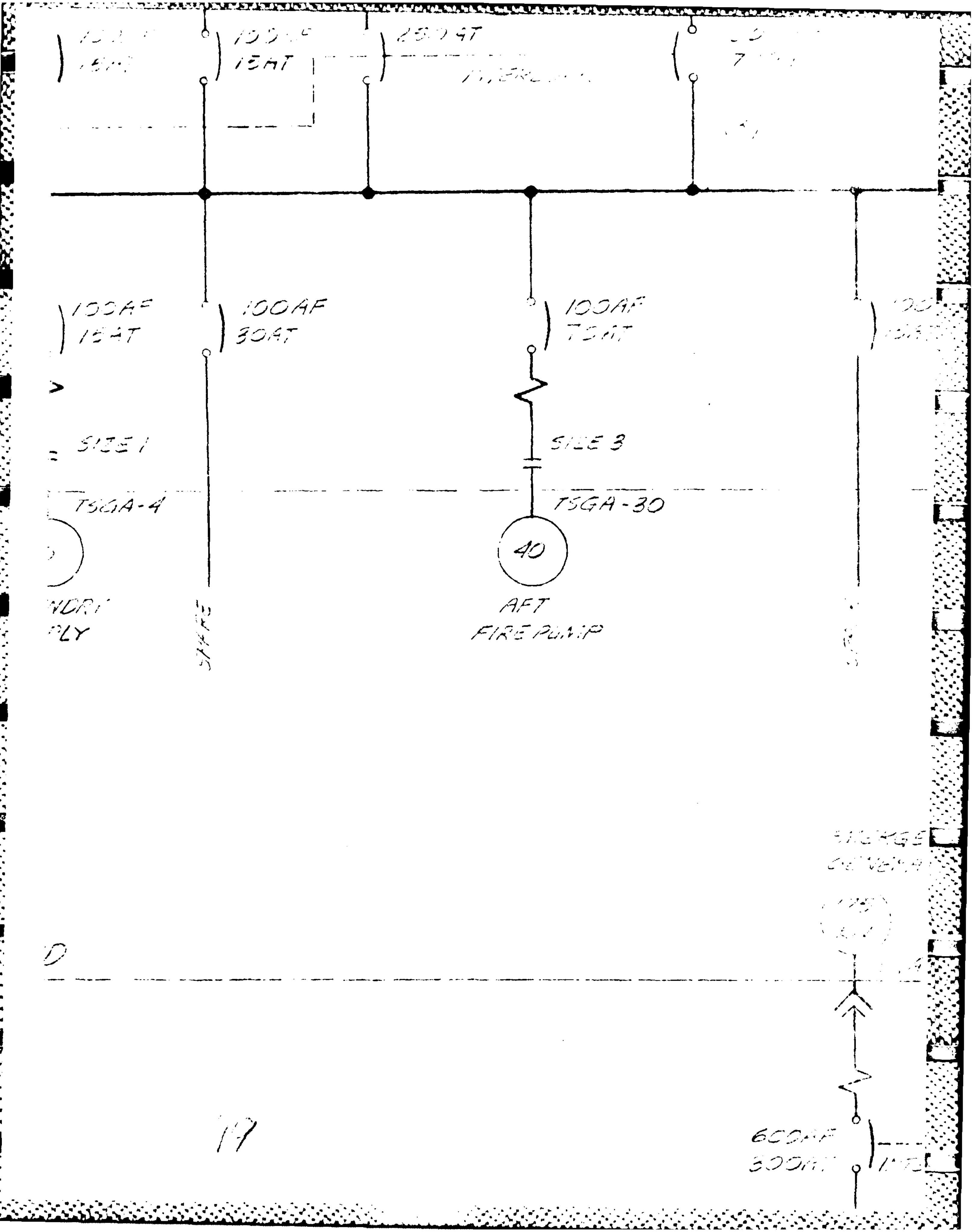


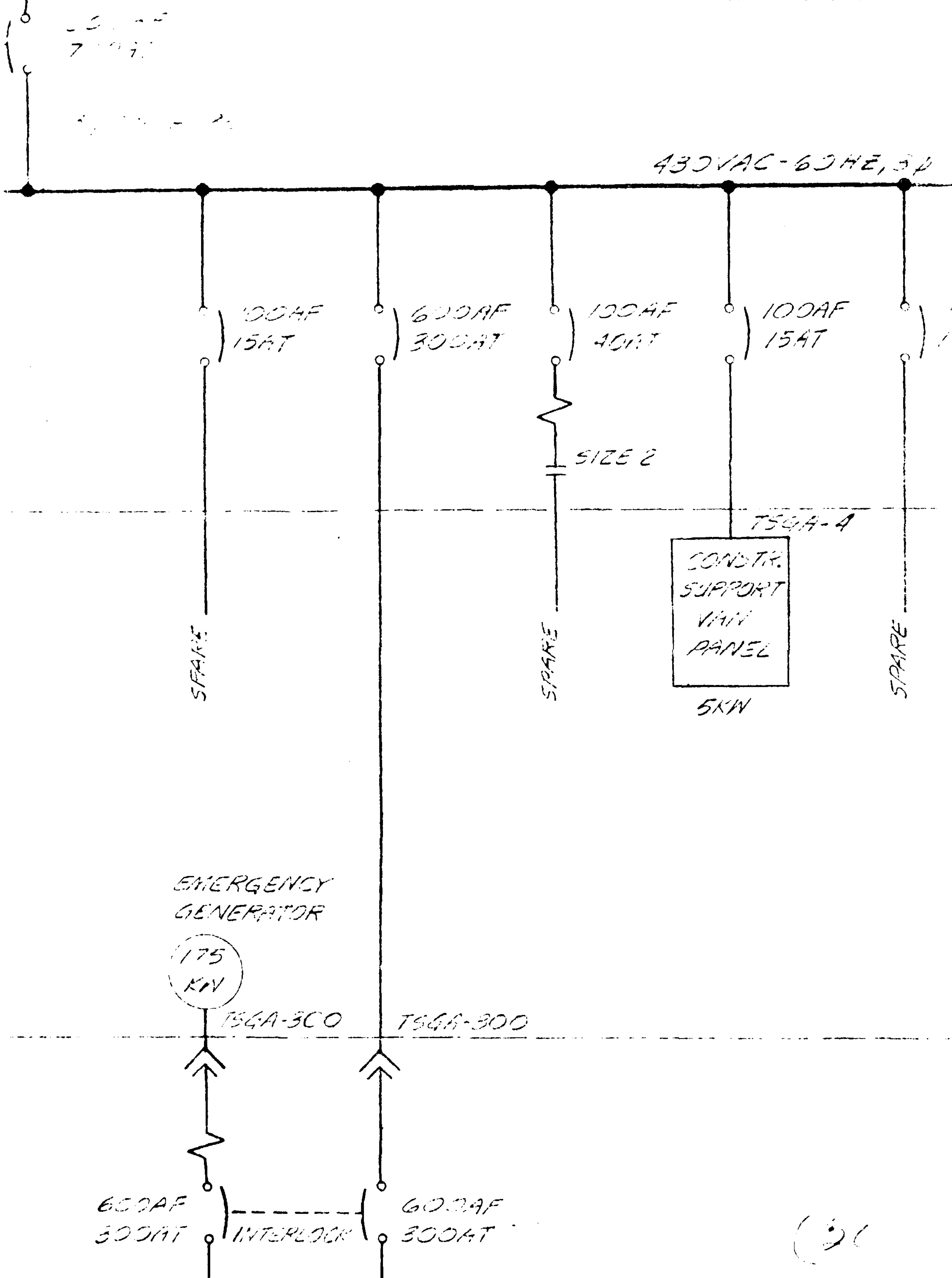
15AT
15AT
70AT
70AT
70AT
70AT
15AT
15AT
SIZE 3
SIZE 1
SIZE 1
40
3
MAIN SALT WATER CIRC. PUMP
SANITARY WATER PUMP (PRESS. SET)
POTABLE WATER PUMP (PRESS. PUMP)

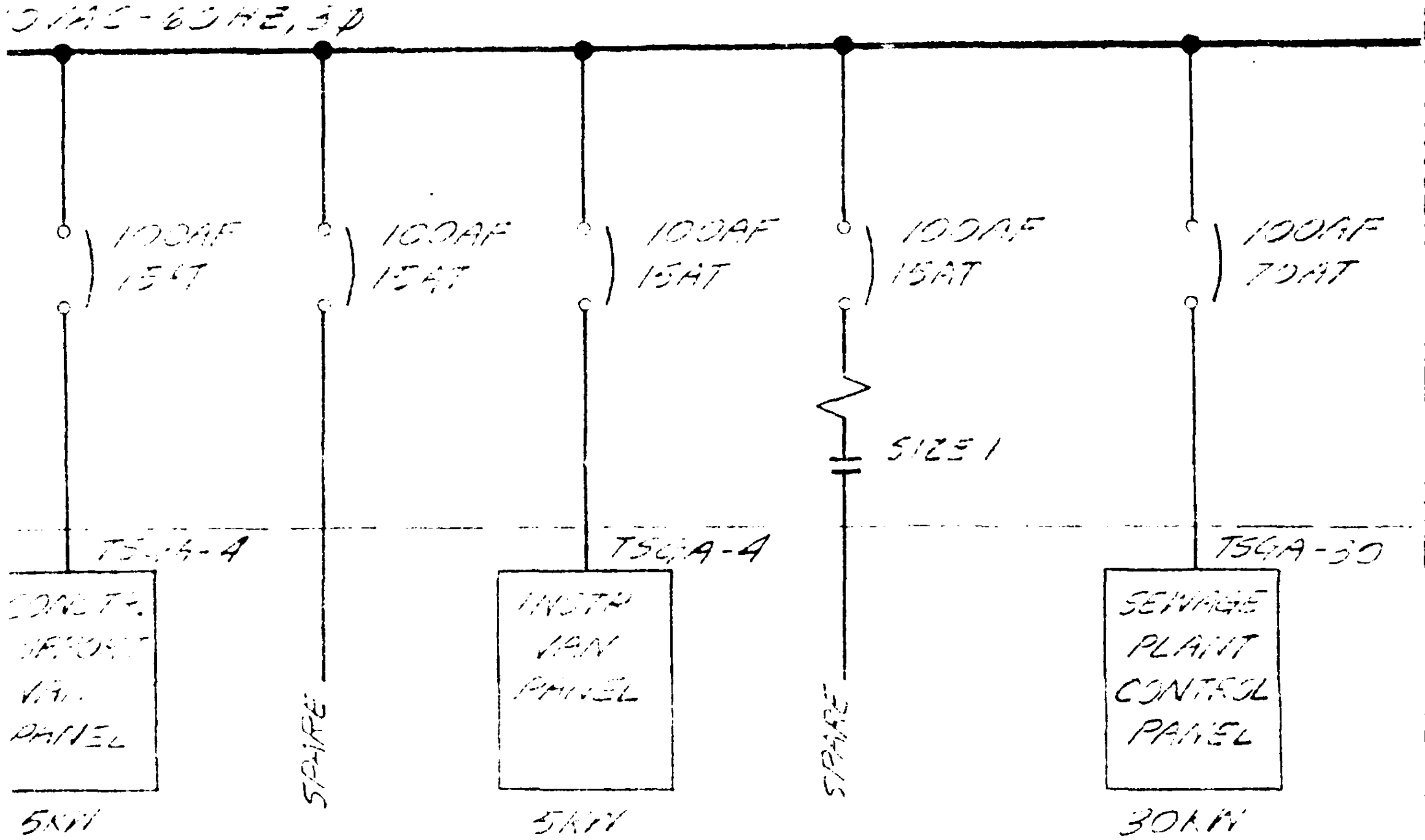
17



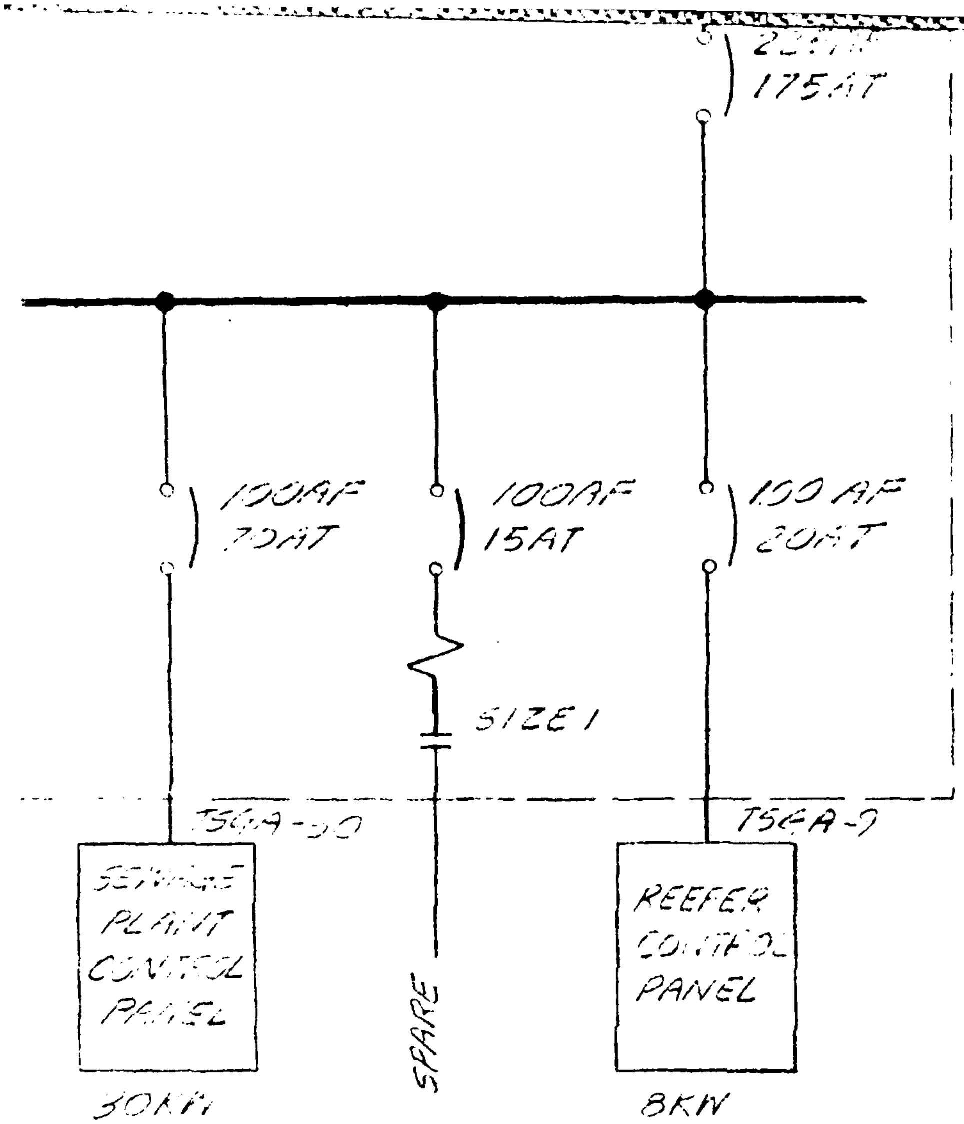
EMERGENCY SWITCHBOARD

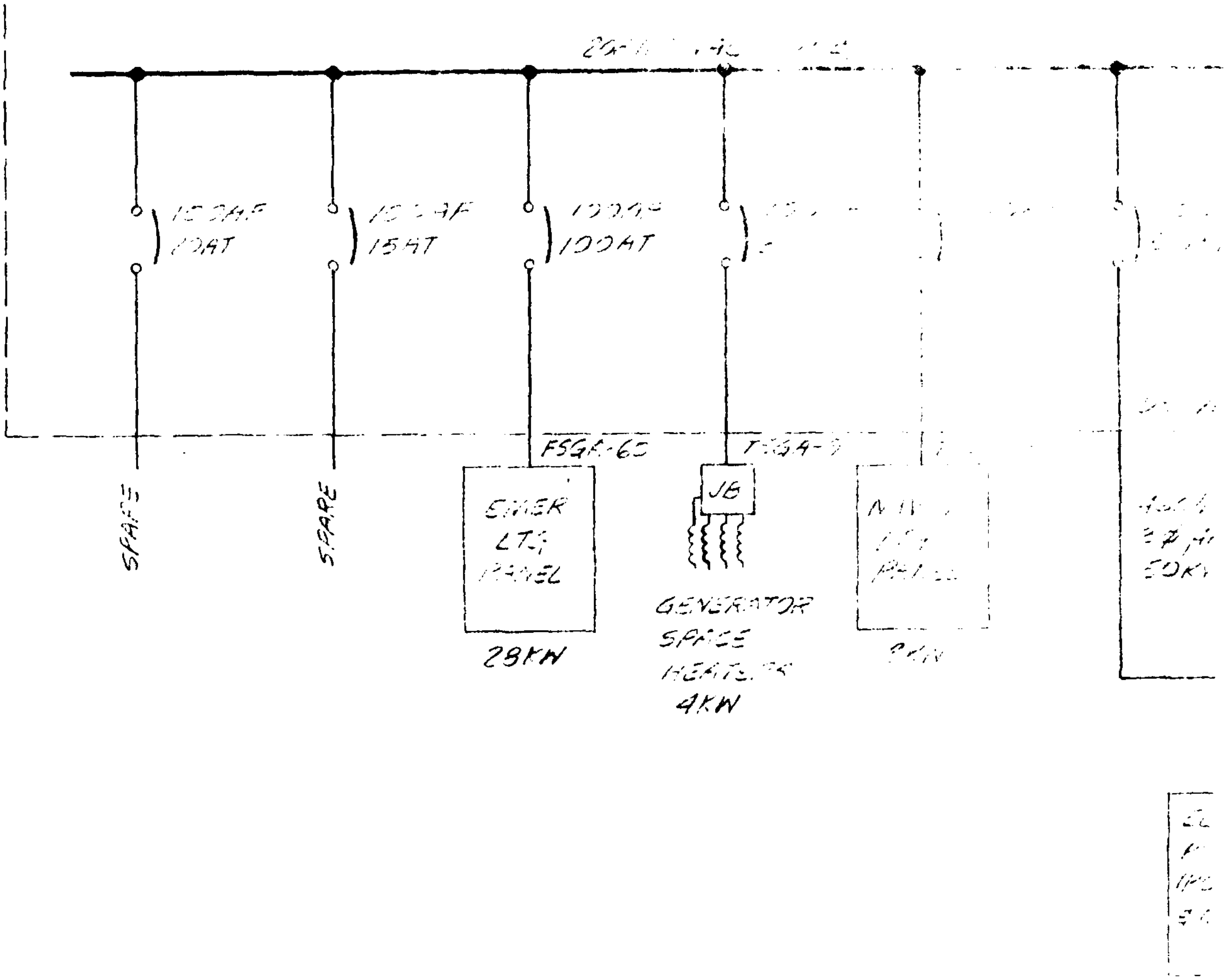

250 AT
100AF
15AT
100AF
30AT
100AF
SIZE 1
SIZE 3
TSGA-4
TSGA-30
40
AFT
FIRE PUMP
600AF


480VAC-60HZ,3φ
100AF
15AT
600AF
300AT
100AF
40AT
100AF
15AT
SIZE 2
TSGA-4
CONDTR.
SUPPORT
VAN
PANEL
5KW
SPARE
SPARE
SPARE
EMERGENCY
GENERATOR
175
KW
TSGA-300
TSGA-300
600AF
300AT
INTERLOCK
600AF
300AT



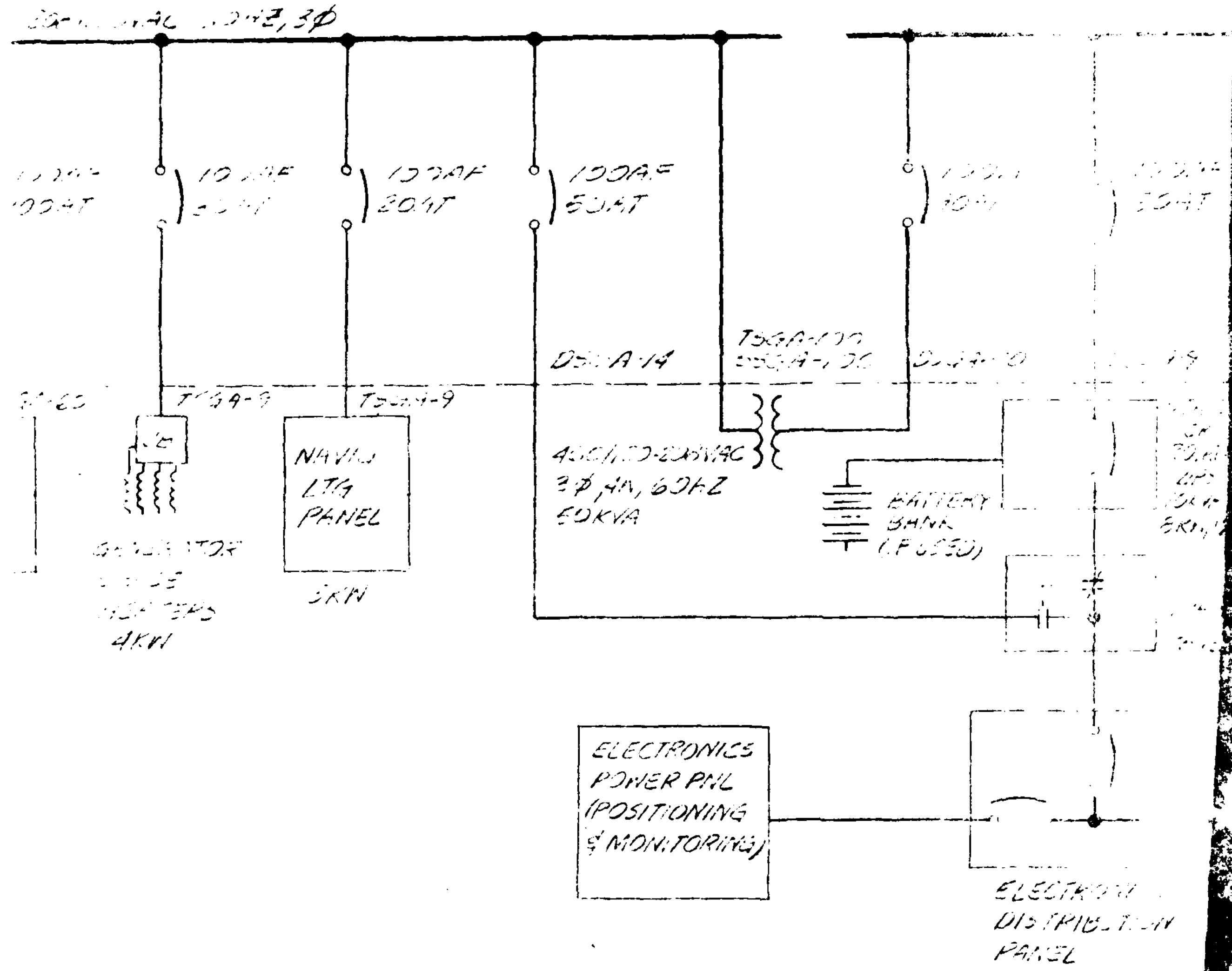
100AF
15AT
100AF
15AT
100AF
15AT
100AF
15AT
100AF
70AT
SIZE 1
TSGA-4
TSGA-4
TSGA-50
INSTR
VAN
PANEL
SEWAGE
PLANT
CONTROL
PANEL
SPARE
SPARE
5KW
5KW
30KW

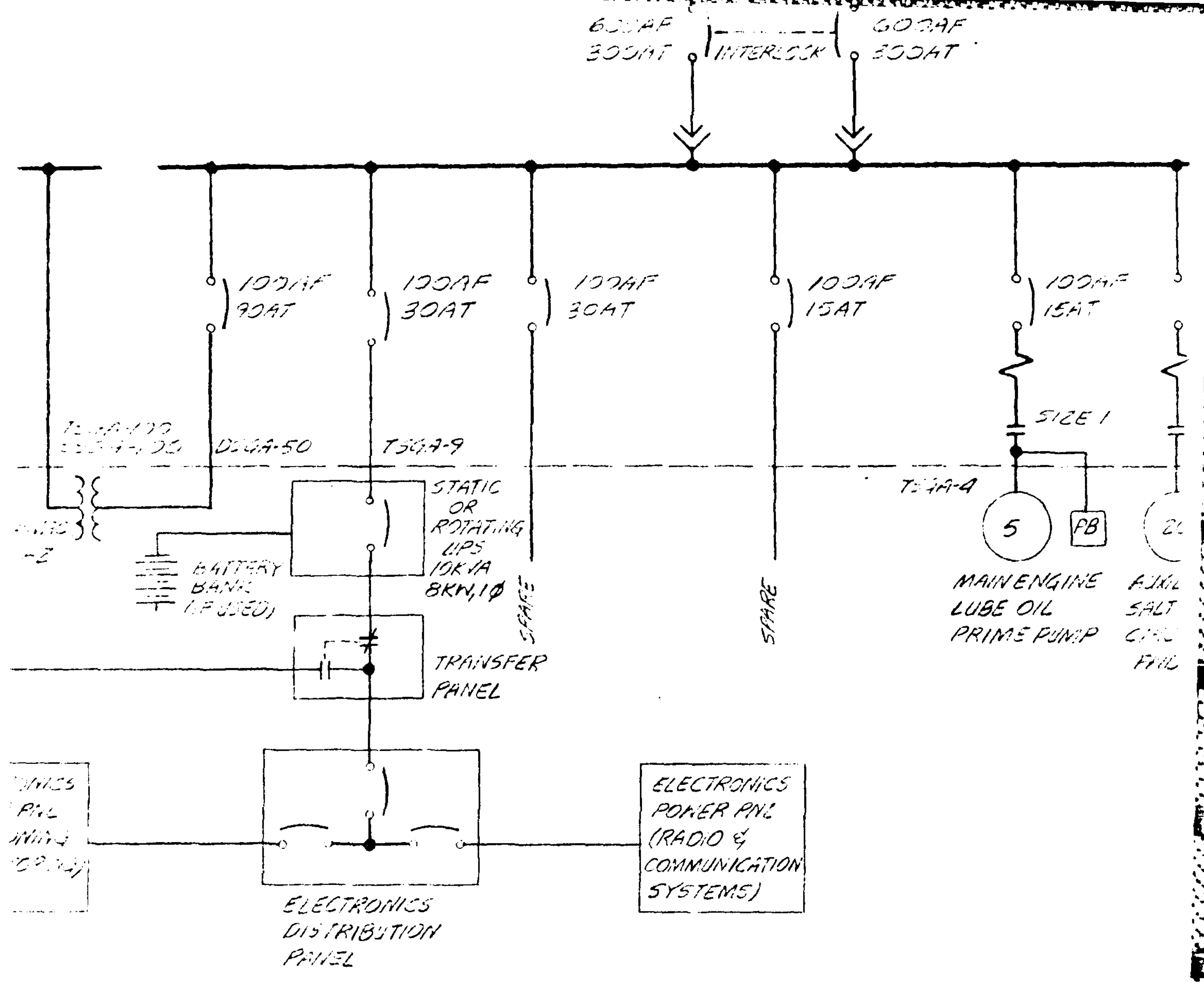

175AT
100AF
100AF
15AT
100 AF
20AT
SIZE 1
TSGA-9
REEFER
CONTROL
PANEL
SPARE
30KW
8KW



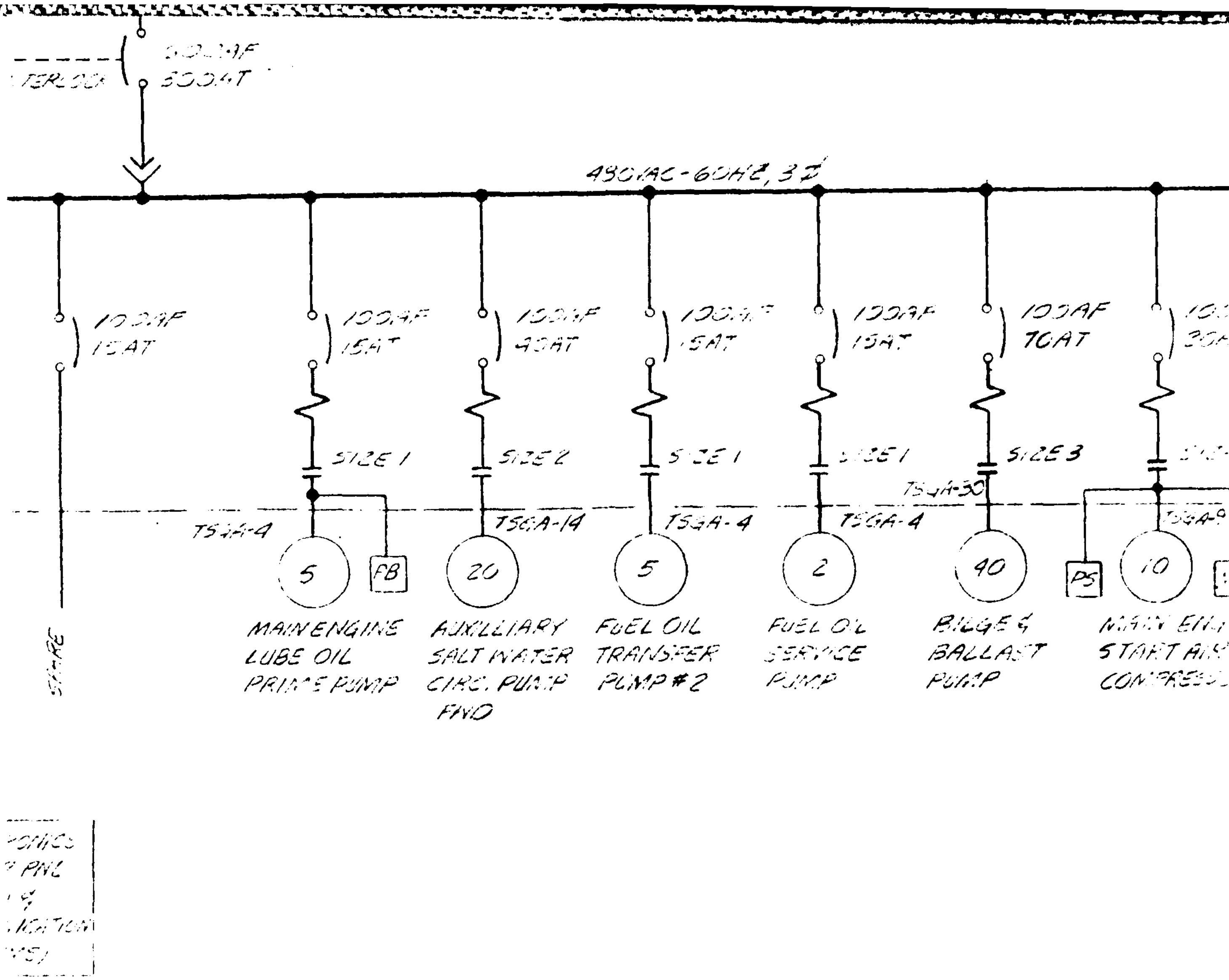
15AT
100AT
FSGA-65
SPARE
SPARE
PANEL
28KW
JB
GENERATOR
SPACE
4KW

23


100AF
20AT
100AF
50AT
DS-A-14
NAVIG
LTG
PANEL
3KW
4KW
3Ø,4W,60HZ
50KVA
BATTERY
BANK
ELECTRONICS
POWER PNL
(POSITIONING
& MONITORING)
PANEL

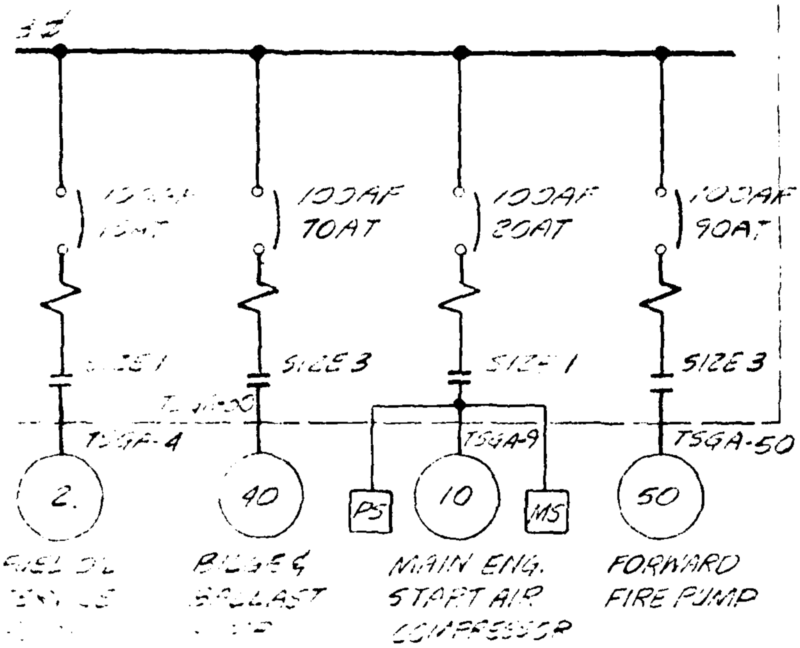

600AF
300AT
INTERLOCK
600AF
300AT
100AF
90AT
100AF
30AT
100AF
30AT
100AF
15AT
100AF
15AT
SIZE 1
DSGA-50
TSGA-9
TSGA-4
STATIC
OR
ROTATING
UPS
10KVA
8KW,1Ø
BATTERY
BANK
(IF USED)
SPARE
SPARE
5
PB
MAIN ENGINE
LUBE OIL
PRIME PUMP
TRANSFER
PANEL
ELECTRONICS
POWER PNL
(RADIO &
COMMUNICATION
SYSTEMS)
ELECTRONICS
DISTRIBUTION
PANEL

105



800AT
480VAC-60HZ, 3Φ
100AF
15AT
100AF
15AT
100AF
40AT
100AF
15AT
100AF
15AT
100AF
70AT
SIZE 1
SIZE 2
SIZE 1
SIZE 3
TSGA-4
TSGA-14
TSGA-4
TSGA-4
TSGA-30
5
FB
20
5
2
40
PS
10
MAIN ENGINE LUBE OIL PRIME PUMP
AUXILLIARY SALT WATER CIRC. PUMP FWD
FUEL OIL TRANSFER PUMP #2
FUEL OIL SERVICE PUMP
BILGE & BALLAST PUMP
SPARE

26



RESERVATION

THIS DRAWING IS FOR ESTIMATIN

NO	DATE	BY	

GL
DEV

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AND MAY NOT BE REPRODUCED OR DISC
THE PRIOR WRITTEN CONSENT OF
TO GLOBAL MARINE DEVELOPMENT, IN

NO REQ'D		NEXT ASSEMBLY
		ALTERATION
		DATE
		SHIPYARD
		LOS ANGELES
		TECHNICAL SERVICES
		PURCHASING
		ESTIMATING
		USCG
		ABS

NAV
WEST COAST DCE
CONV. ELEC. DIS

	DATES
ENGR.	
DFT.	
CHK.	
APPR.	
REL.	

77

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NO	DATE	BY	DESCRIPTION	APPROVED

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Los Angeles, Calif.

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NEXT ASSEMBLY	
ALTERATION DATE	NAVFAC (FPO-1)
SHIPYARD	WEST COAST OCEAN CONSTR. PLAT. (FNE HULL
LOS ANGELES	CON'/. ELEC. DISTR. LAYOUT (PRELIMINARY)
TECHNICAL SERVICES	
PURCHASING	
ESTIMATING	
USCG	
ABS	

	DATES	SCALE:	TOLERANCE UNLESS OTHERWISE NOTED	
ENGR.	1.12.7	NONE	FRACTION ± 1/16"	DECIMAL .00 = ± .03
DFT. D. MORRIS	1.12.		ANGULAR ± ½°	.000 = ± .010
CHK.	1.27.7	JOB AUTH.	DWG. NO.	ALT
APPR.	4.2.	04072	R • 4072 • E001	A
REL.	4.4.7	010000		

(38)

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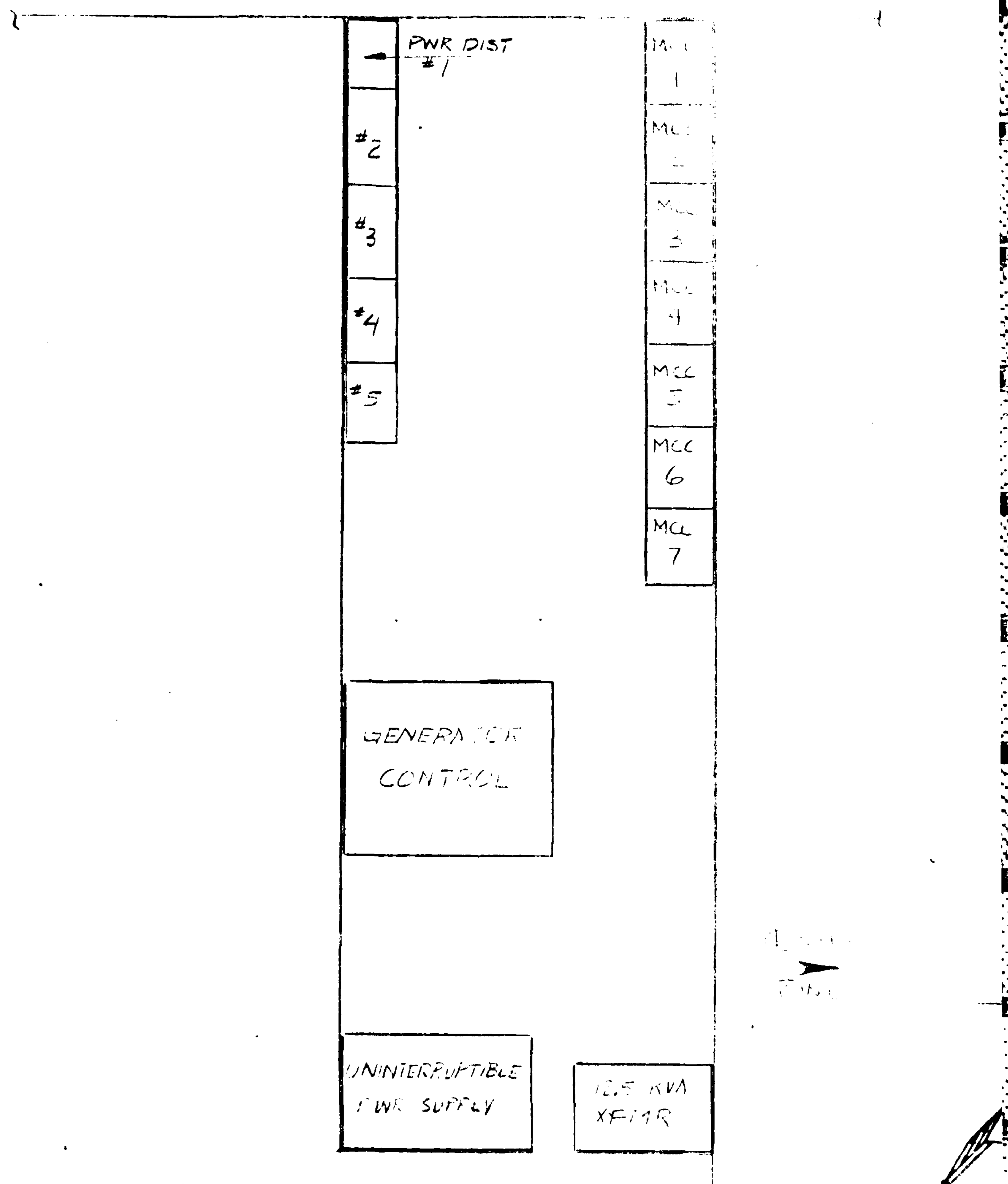
(1)



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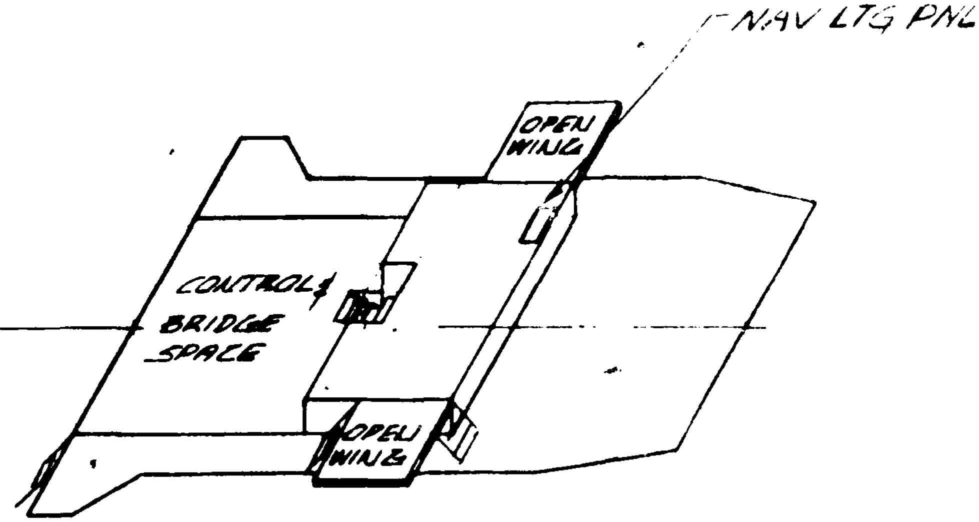
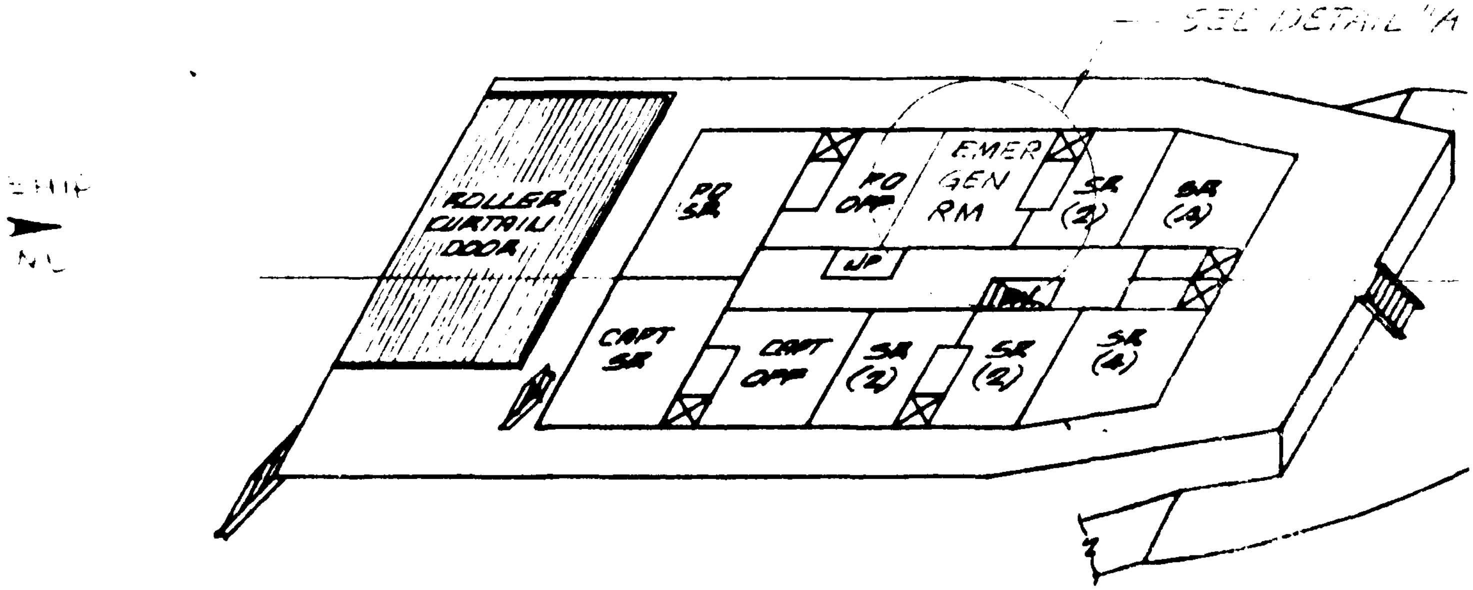
DETAIL B

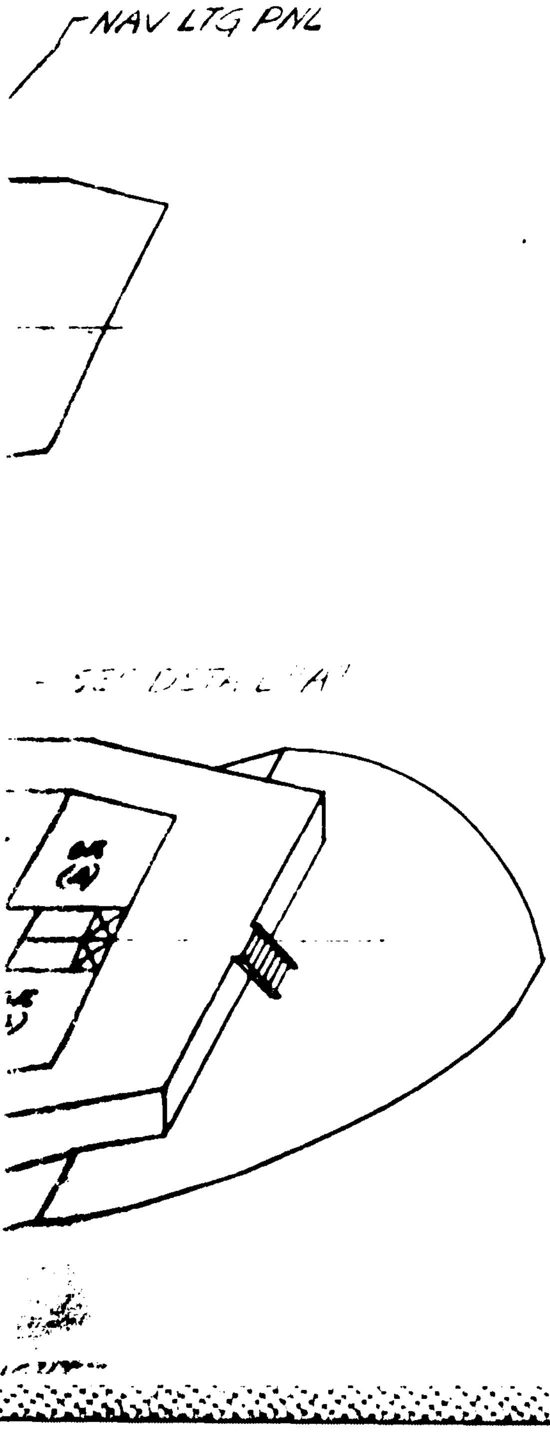
(2)

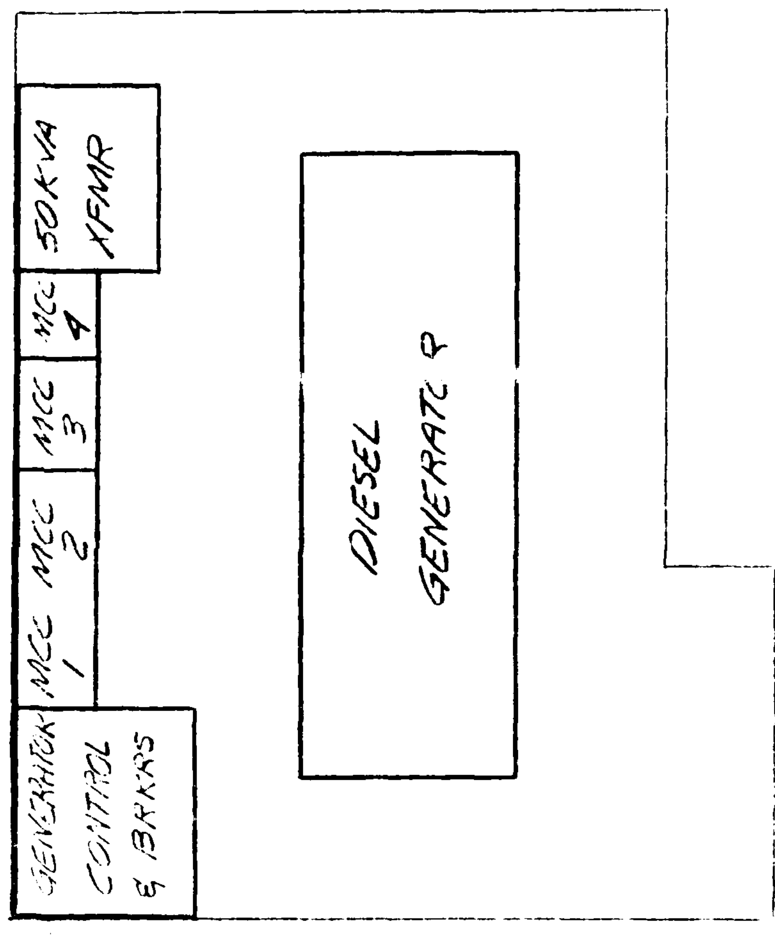


O2 LEVEL



O1 LEVEL

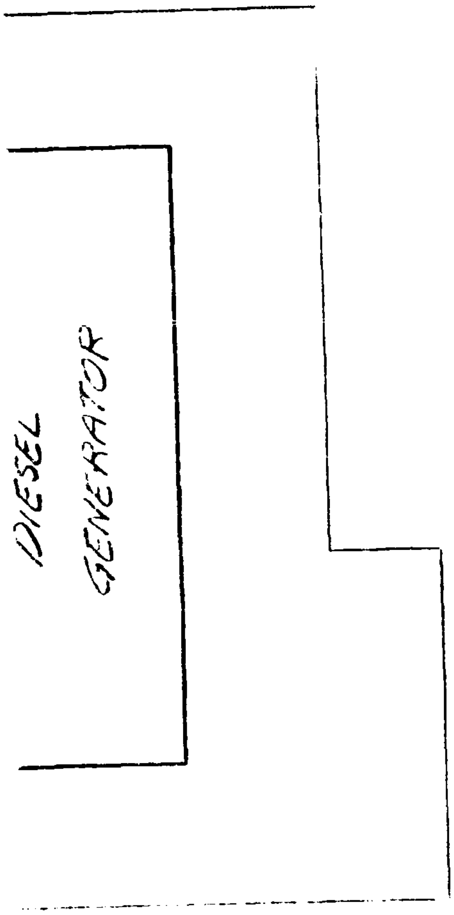




DETAIL "A"
SCALE 3/8" = 1'-0"

LIST OF MAT

ITEM	QTY	DESCRIPTION



TAIL 'A'
E 3/8" = 1'-0"

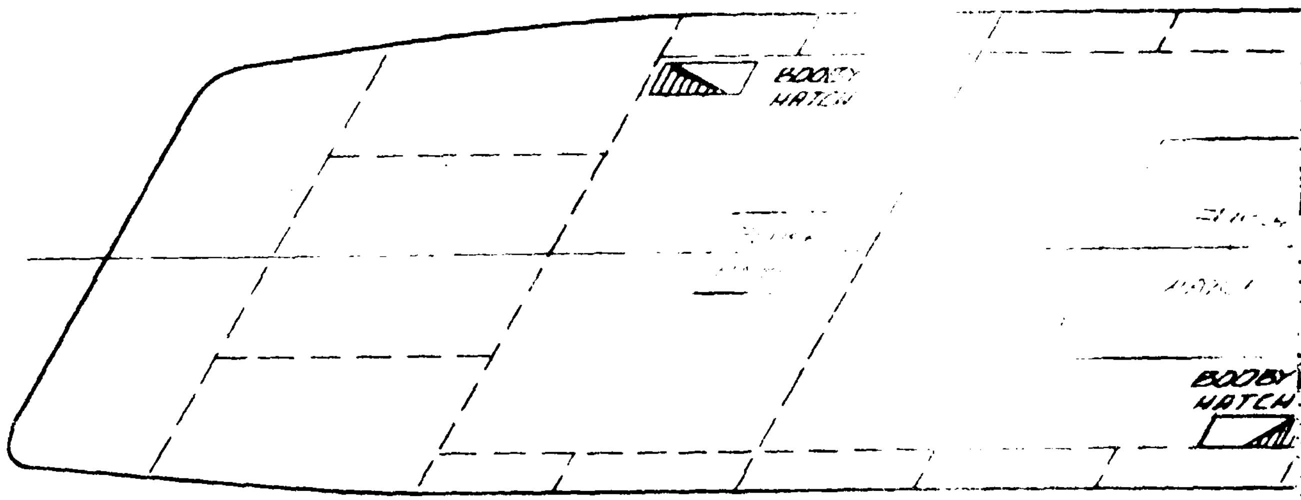
NOTES:

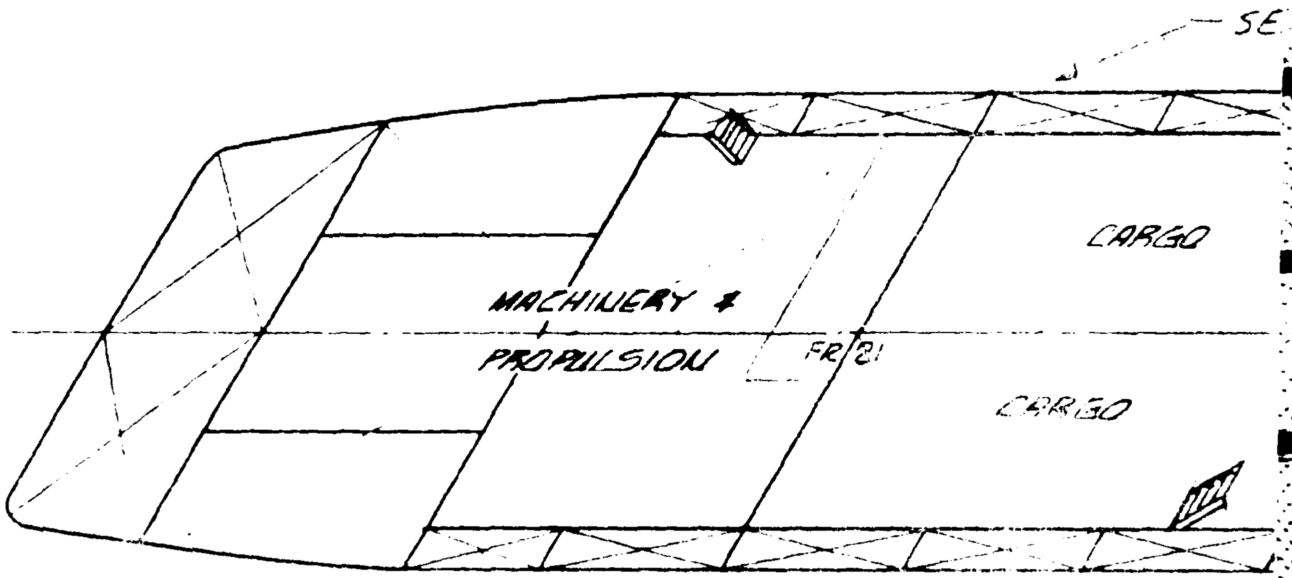
1. ALL CONSTRUCTION AND INSTALLATIO
CONFORM TO APPLICABLE U.S.C.G. &
2. LIGHTING OF ALL AREAS SHALL MEET
U.S.C.G. REQUIREMENTS.
3. WIRING WILL BE IN ACCORDANCE WIT
AND NAVY REGULATIONS.
4. EMERGENCY EQUIPMENT WILL BE INST
AND NAVY REQUIREMENT.

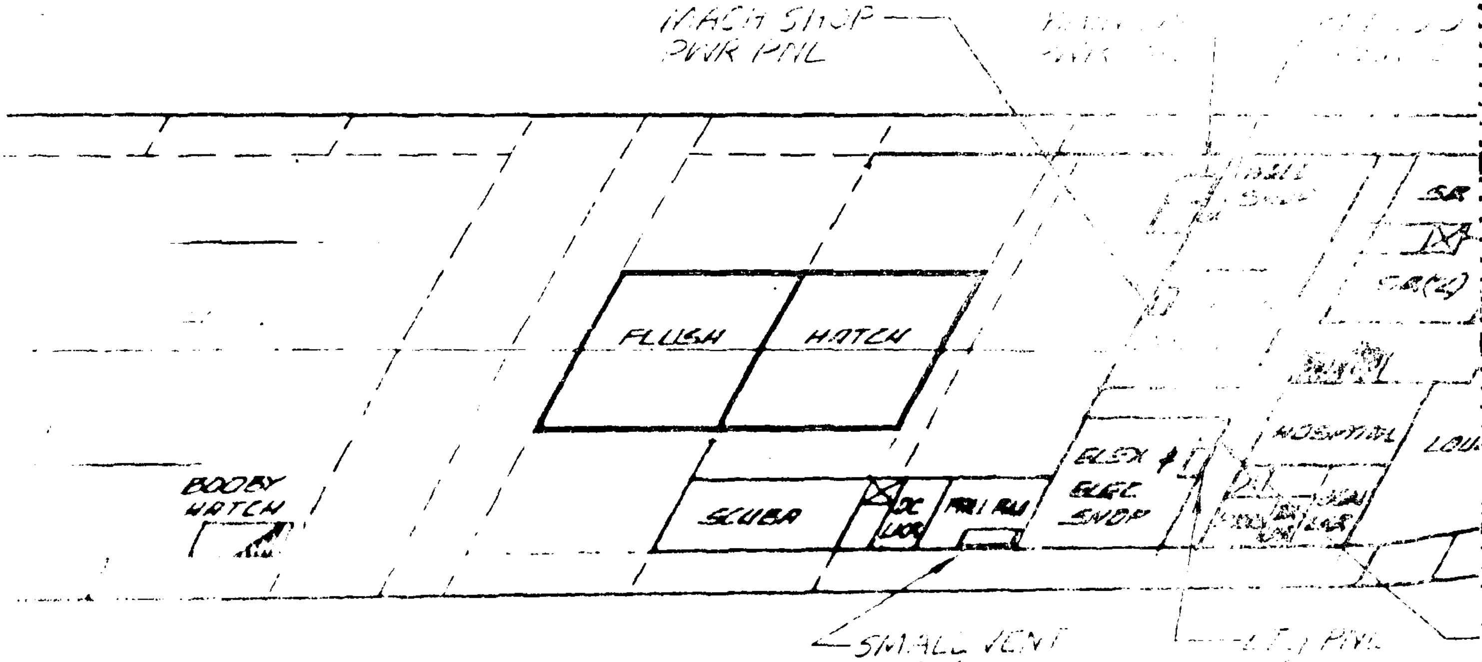
LIST OF MATERIALS			
ITEM	QTY	DESCRIPTION	MATERIAL

NOTES:

1. ALL CONSTRUCTION AND INSTALLATION OF EQUIPMENT SHALL CONFORM TO APPLICABLE U.S.C.G. & NAVY REGULATIONS.
2. LIGHTING OF ALL AREAS SHALL MEET OR EXCEED MINIMUM U.S.C.G. REQUIREMENTS.
3. WIRING WILL BE IN ACCORDANCE WITH U.S.C.G., IEEE -45, AND NAVY REGULATIONS.
4. EMERGENCY EQUIPMENT WILL BE INSTALLED WITHIN U.S.C.G. AND NAVY REQUIREMENTS.

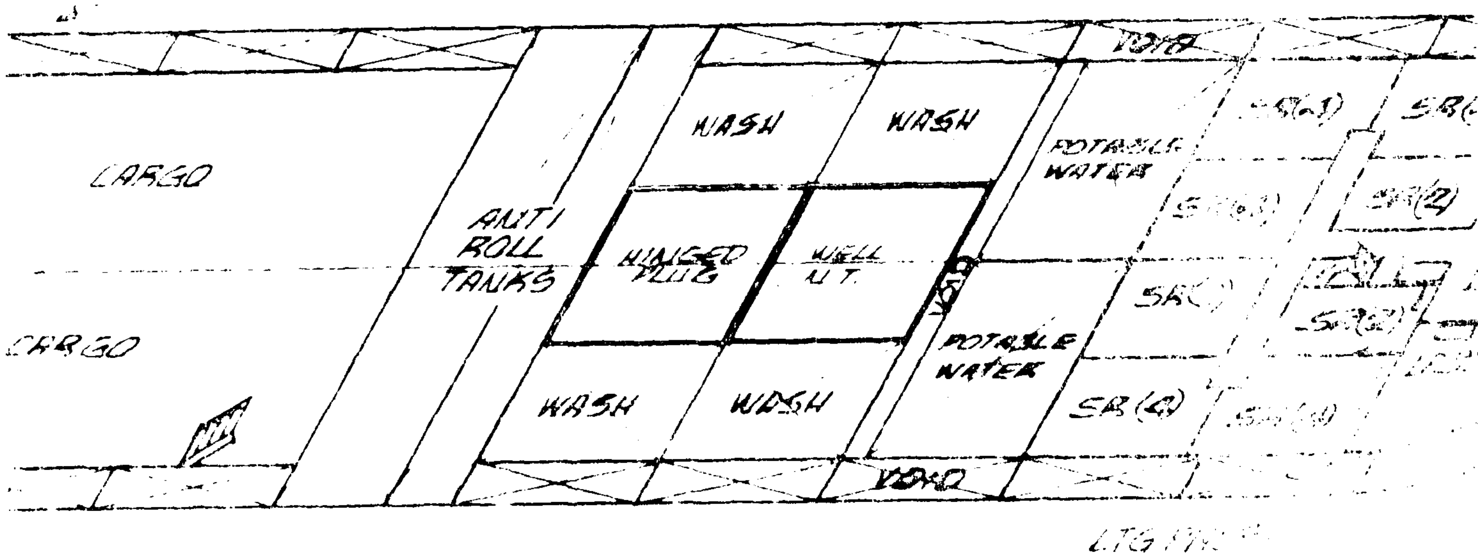

BOOBY HATCH
BOOBY HATCH


SE
CARGO
MACHINERY &
PROPULSION
FR 21
CARGO



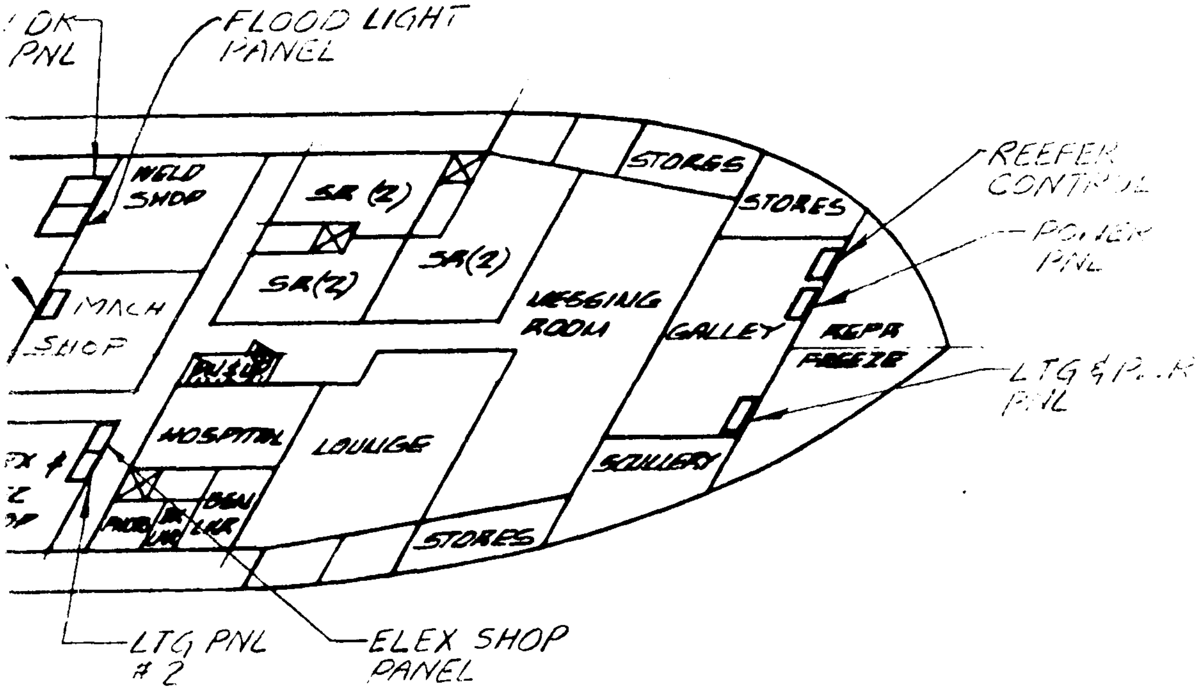
DECK

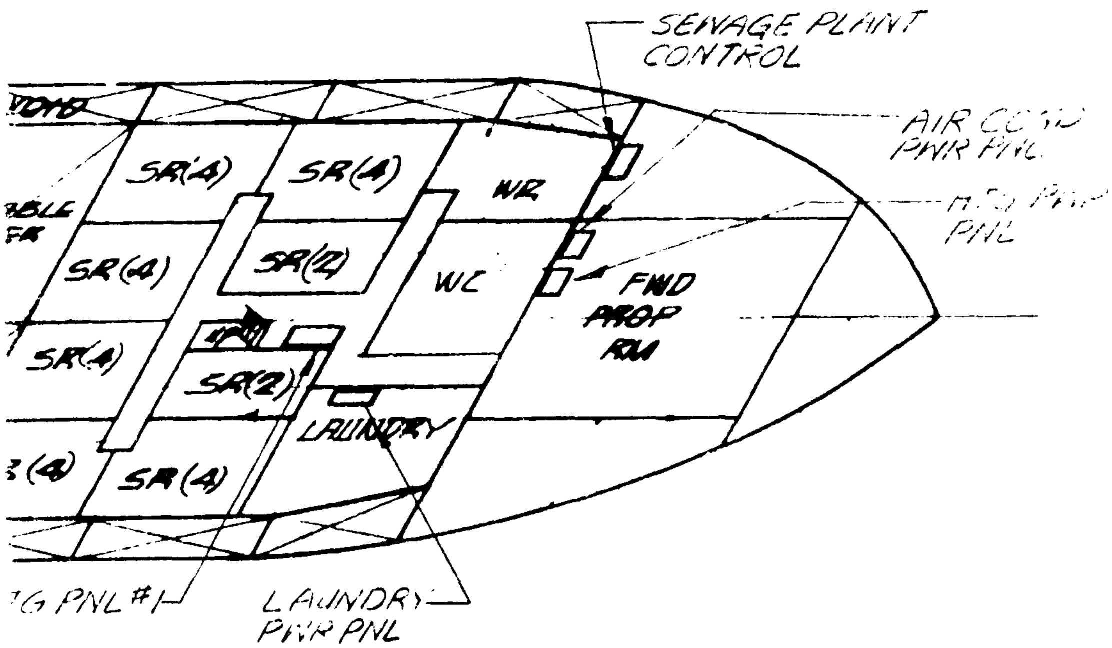
SEE DETAIL B



DECK

'EL


FLOOD LIGHT
PANEL
PNL
WELD
SHOP
SR (2)
SR(2)
SR(2)
STORES
STORES
REEFER
CONTROL
MESSING
ROOM
GALLEY
MACH
SHOP
HOSPITAL
LOUNGE
SCULLERY
STORES
LTG PNL
2
ELEX SHOP
PANEL


SEWAGE PLANT
CONTROL
SR(4)
SR(4)
SR(4)
SR(4)
SR(4)
SR(2)
SR(2)
WR
WC
FWD
PROP
RM
LAUNDRY
LAUNDRY
PWR PNL

EFER
NTROL

POWER
PNL

G & PWR
L

ERVATION

S DRAWING

D

WR

NO	DATE

THIS D
AND N
THE F
TO BE

WEST
YFNB H

NO	REQ'D	NEXT ASSEMBLY
		ALTERATION
		DATE
		SHIPYARD
		LOS ANGELES
		TECHNICAL SERVICES
		PURCHASING
		ESTIMATING
		USCG
		ABS

ENGR.
DFT. D. NO
CHK.
APPR.
REL.

7

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NO	DATE	BY	DESCRIPTION	APPROVED

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NAVFAC (FPO-1)
WEST COAST OCEAN CONSTRUCTION PLATFORM
YFNB HULL CONVERSION - ELECTRICAL EQUIPMENT

ASSEMBLY
ERATION
E
D
ELES
AL SERVICES
SING
ING

		DATES
ENGR.	[illegible]	4-21-78
DFT.	D. NORRIS	4-19-78
CHK.	[illegible]	4-24-78
APPR.	[illegible]	4/24/78
REL.	[illegible]	[illegible]

SCALE: N.T.S.

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16"
DECIMAL .00 = ± .03
.000 = ± .010
ANGULAR ± 1/2°

JOB AUTH. 04072 010000

DWG. NO. D •4072•E002

ALT A

10

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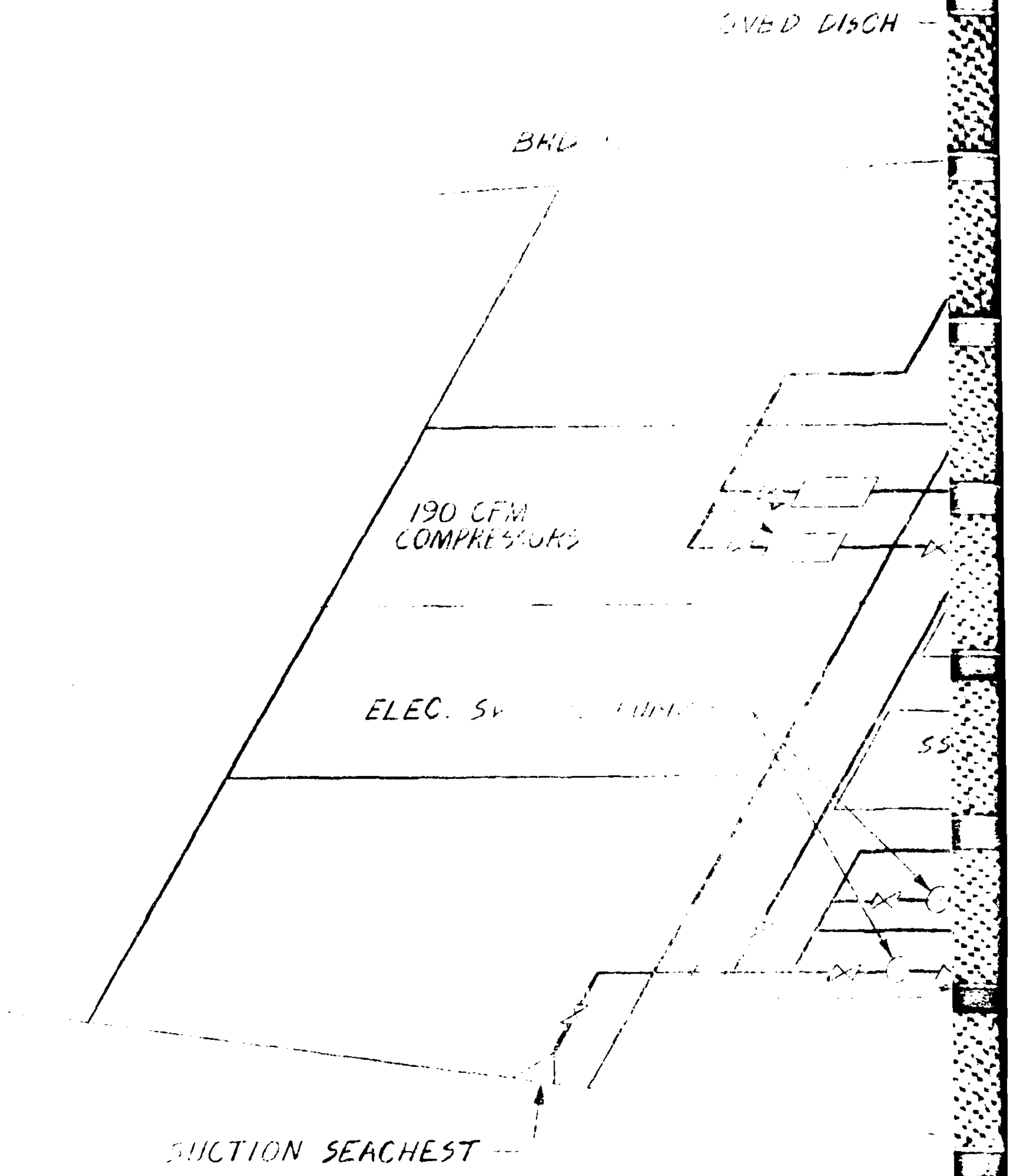
APPENDIX M

SYSTEM ISOMETRIC DRAWINGS FOR YFNB

PIPING/VENTILATION DRAWINGS

D.4072-P001	Salt Water Cooling System
D.4072-P002	Firemain System
D.4072-P003	Compressed Air System
D.4072-P004	Plumbing and Drain System
D.4072-P005	Wash Water and Potable Water Systems
D.4072-P006	Sewage System
D.4072-P007	Fuel Oil and Transfer System
D.4072-P008	Ballast System
D.4072-P009	Heating and Air Conditioning System
D.4072-V001	Ventilation System

(T)



DETAIL "B"
2ND DK MCHRY

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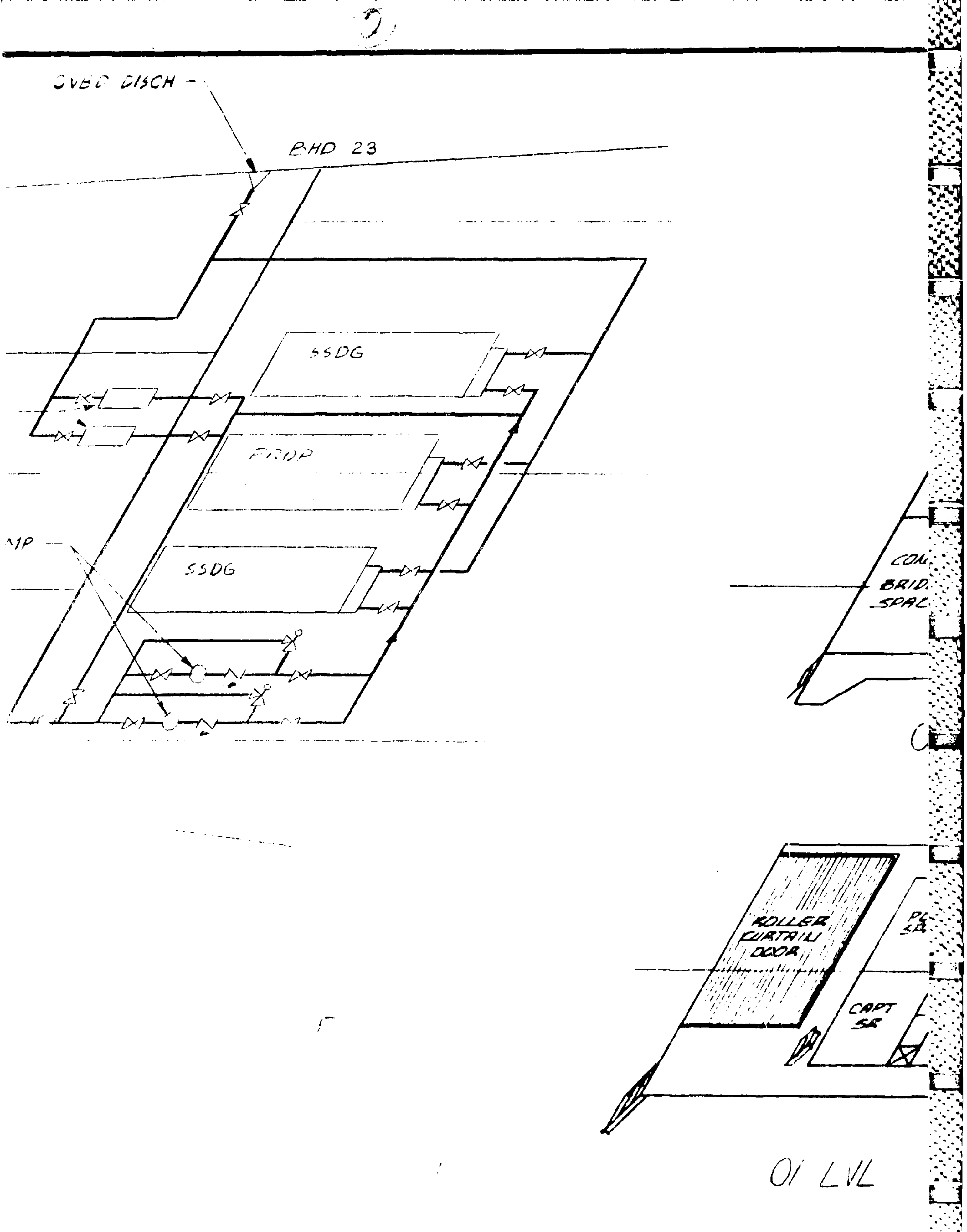
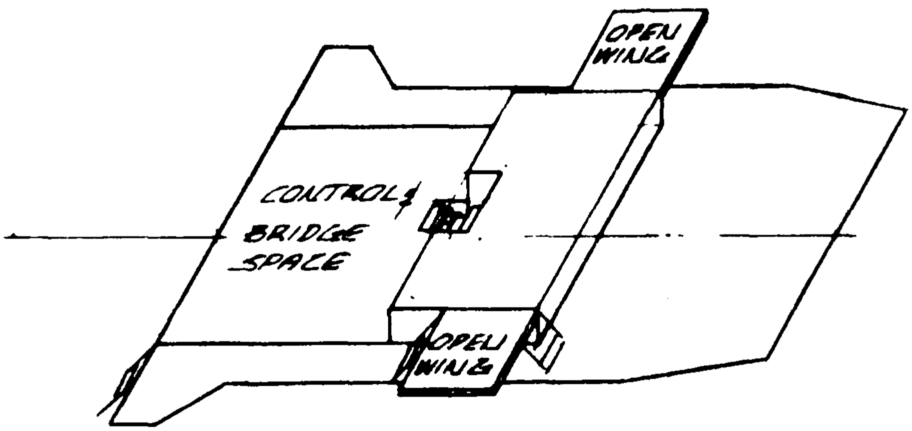
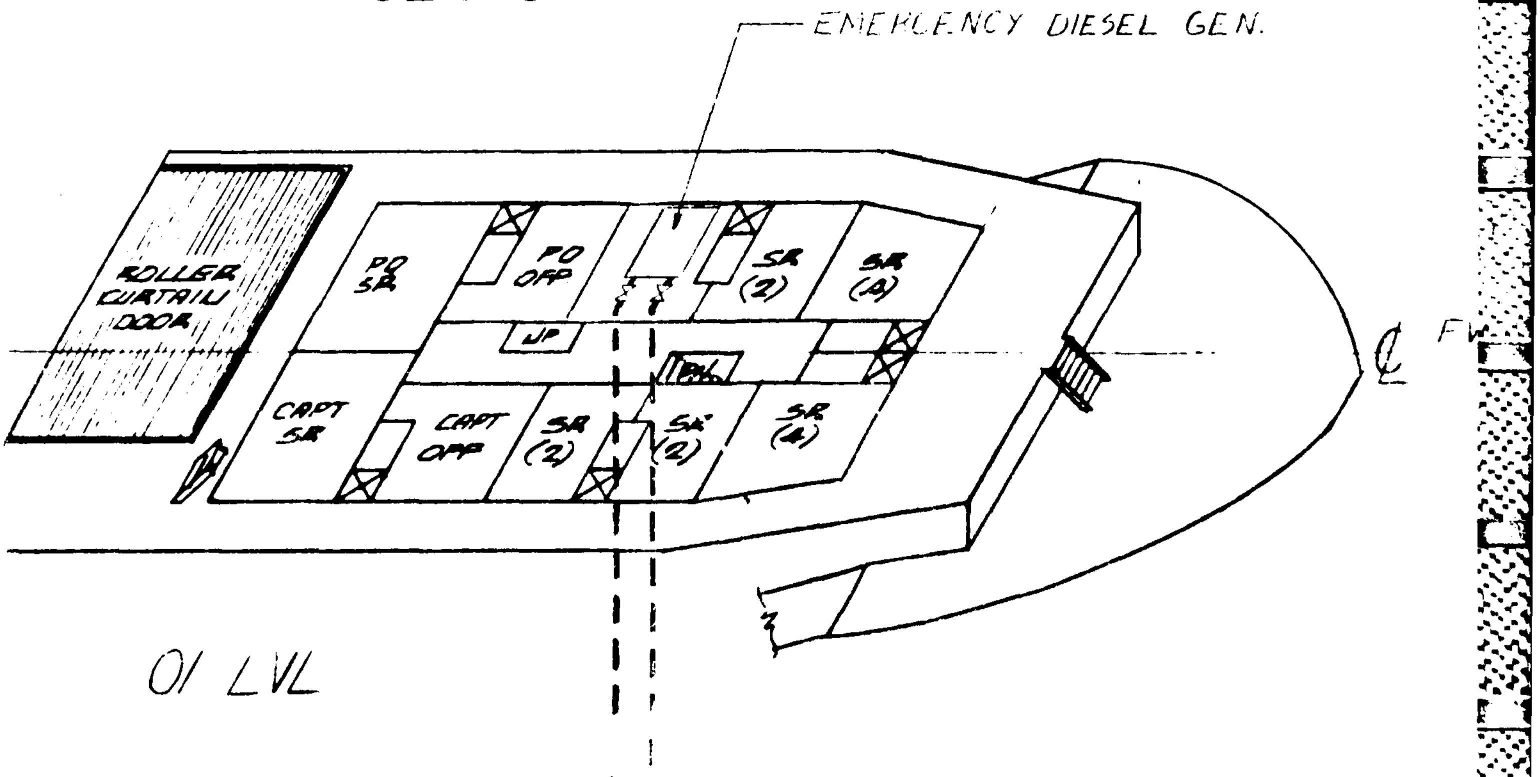
best available copy.


OVBD DISCH
BHD 23
SSDG
PROP
SSDG
MP
COM
BRID
SPAC
ROLLER
CURTAIN
DOOR
CAPT
SR
01 LVL

(3)

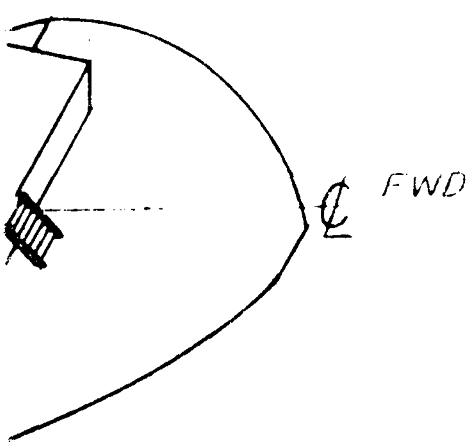


02 LVL



01 LVL

DIESEL GEN.



50

LIST OF MATER

ITEM	QTY	DESCRIPTION

RESERVATION

THIS DRAWING IS FOR ESTIMATING ONLY. NOT FOR

GENERAL NOTES:

1. MATERIALS & WORKMANSHIP SHALL MEET ABS & U
2. STRAINER BASKETS SHALL BE MADE OF STAINLES
3. DECK, BULKHEAD & SHELL PENETRATIONS SHALL
   DOUBLER PLATES.
4. OVERBOARD DISCHARGES ARE TO BE LOCATED AT
   LINE, PIPE BETWEEN SEA VALVE & SHELL SHALL
   POSSIBLE.
5. LOW POINT DRAINS SHALL BE FITTED WITH BOSS
6. ALL VALVES SHALL HAVE ENGRAVED LABEL PLATE
7. PIPING IN COMPARTMENTS SHALL BE INSULATED

LIST OF MATERIALS

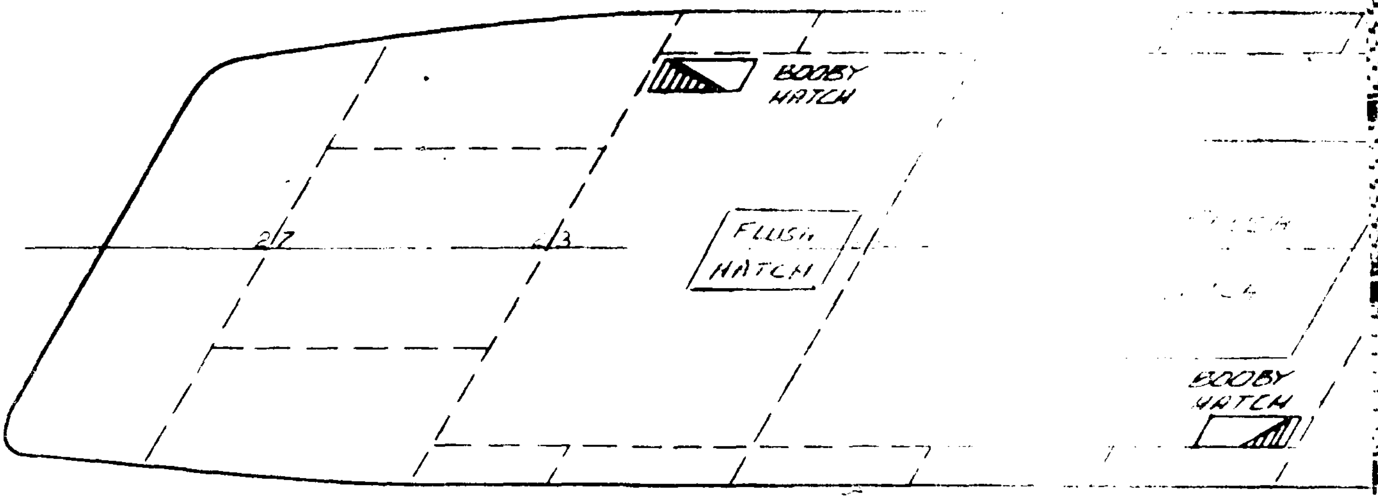
EM	QTY	DESCRIPTION	MATERIAL

IS FOR ESTIMATING ONLY. NOT FOR CONSTRUCTION.

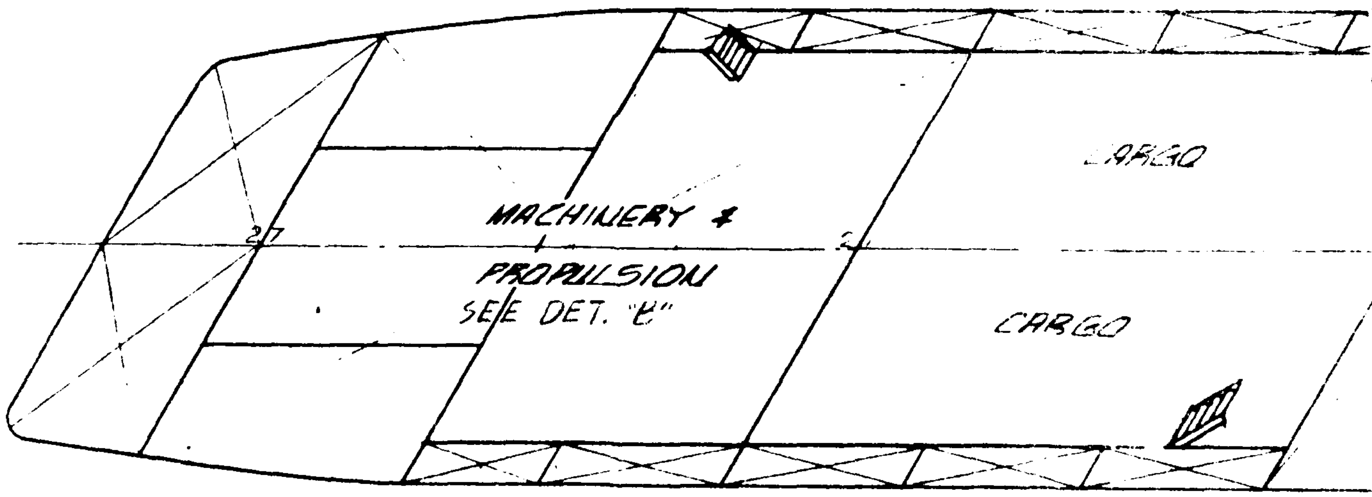
S:

& WORKMANSHIP SHALL MEET ABS & USCG REQUIREMENTS.
BASKETS SHALL BE MADE OF STAINLESS STEEL.
KHEAD & SHELL PENETRATIONS SHALL BE FITTED WITH
PLATES.
DISCHARGES ARE TO BE LOCATED AT THE DEEPEST LOAD
BETWEEN SEA VALVE & SHELL SHALL BE AS SHORT AS

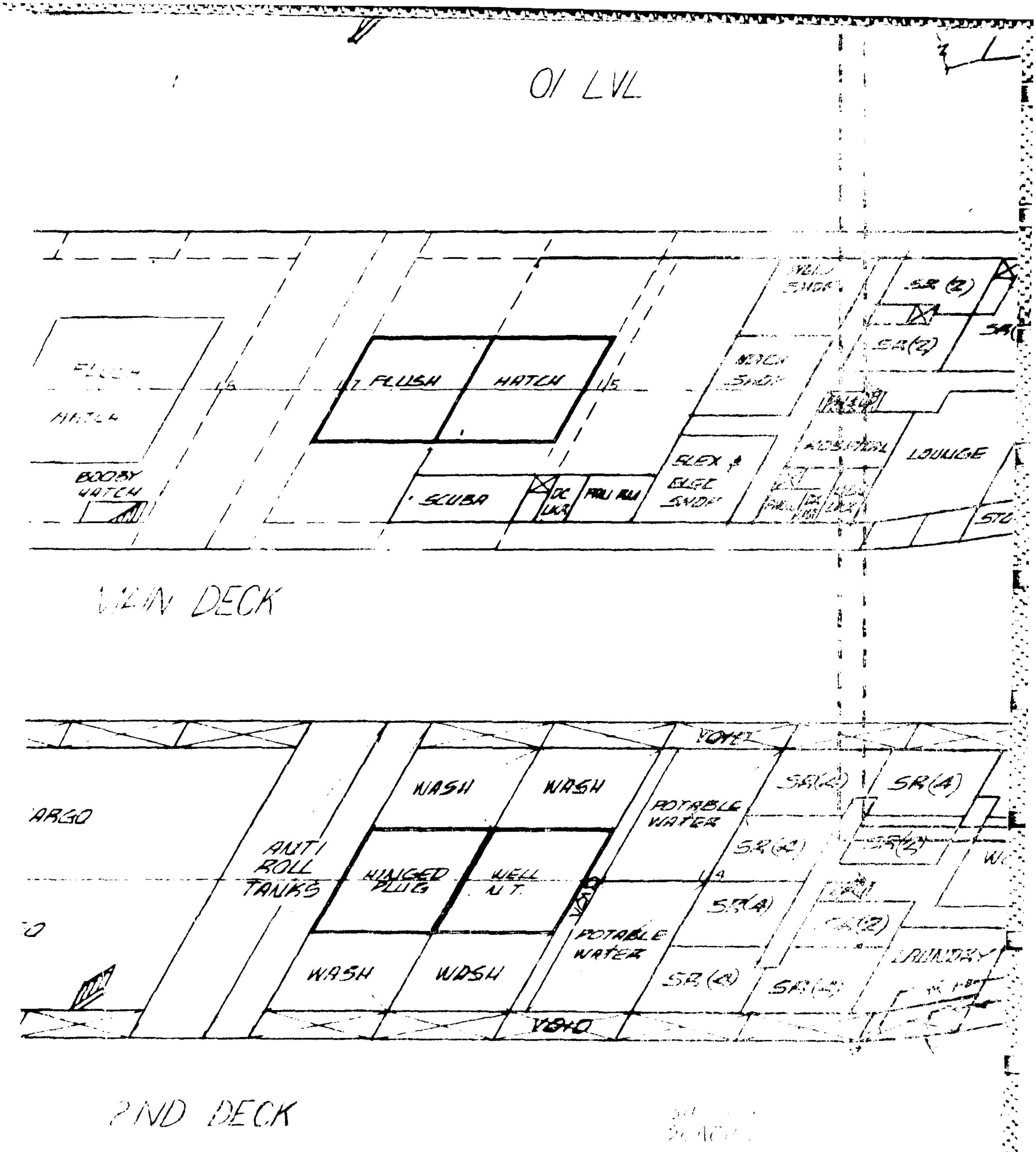
DRAINS SHALL BE FITTED WITH BOSSES & GATE VALVES.
ES SHALL HAVE ENGRAVED LABEL PLA
COMPARTMENTS SHALL BE INSUL [illegible] TO
SWEATING


BOOBY HATCH
FLUSH HATCH
BOOBY HATCH
27
3

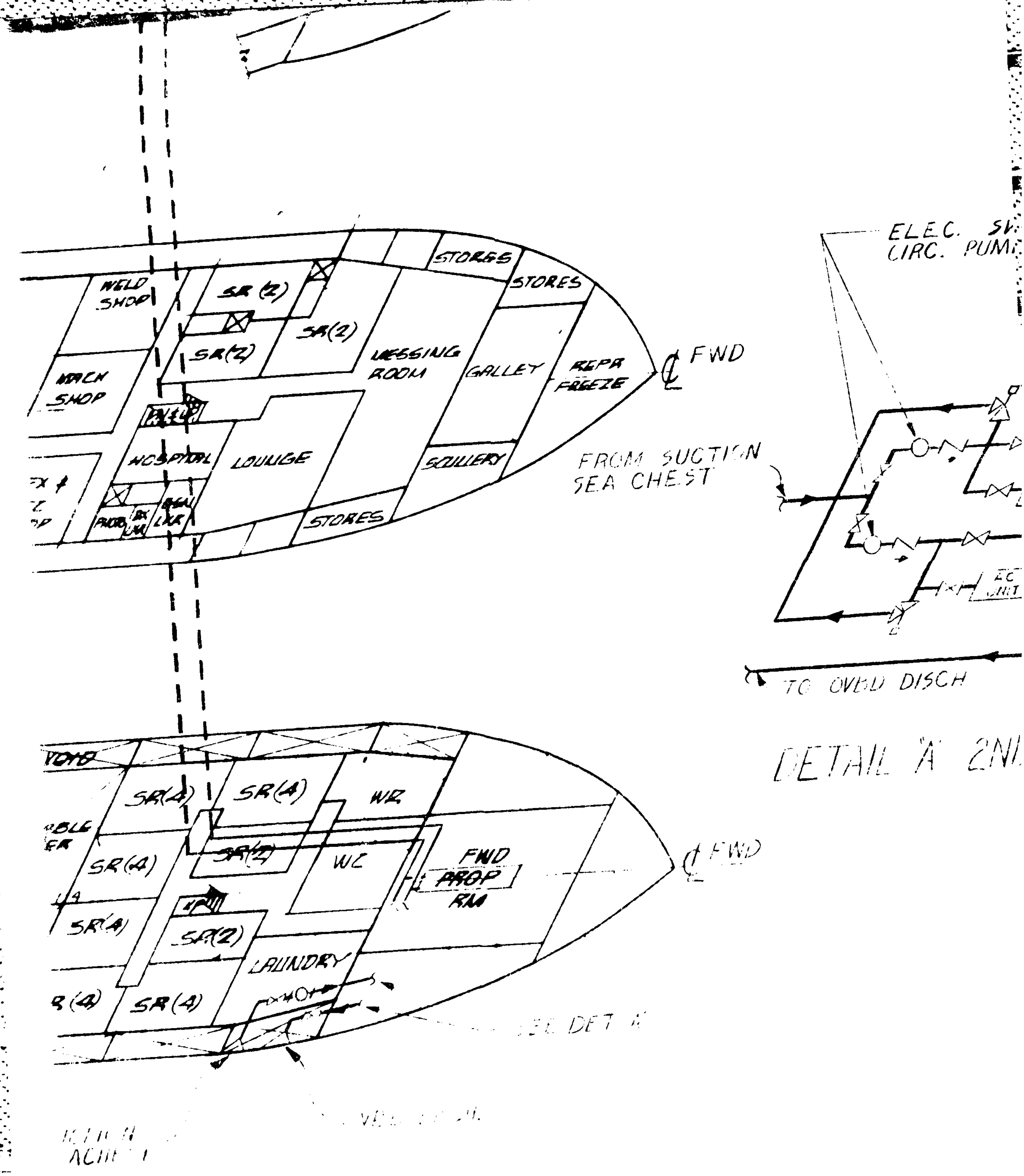
MAIN


MACHINERY &
PROPULSION
SEE DET. "B"
CARGO
CARGO
27

2ND



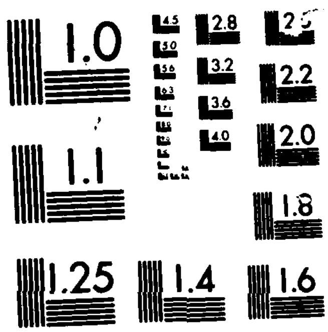
01 LVL
FLUSH
HATCH
BOOBY
HATCH
FLUSH
HATCH
SCUBA
DC
LKR
ELEX &
ELEC
SHOP
SR(2)
SR(2)
LOUNGE
MAIN DECK
WASH
WASH
POTABLE
WATER
SR(4)
SR(4)
ARGO
ANTI
ROLL
TANKS
HINGED
PLUG
WELL
N.T.
SR(4)
POTABLE
WATER
SR(4)
SR(4)
WASH
WASH
SR(2)
LAUNDRY
2ND DECK



WELD SHOP
MACH SHOP
SR (2)
SR(2)
SR(2)
MESSING ROOM
STORES
STORES
GALLEY
REFR FREEZE
HOSPITAL
LOUNGE
SCULLERY
STORES
FWD
FROM SUCTION SEA CHEST
ELEC. SW
CIRC. PUMP
TO OVBD DISCH
DETAIL "A" 2ND
SR(4)
SR(4)
WR
SR(2)
WC
FWD PROP RM
SR(4)
SR(4)
SR(2)
LAUNDRY
SR(4)
FWD

AD-A165 727 WEST COAST OCEAN CONSTRUCTION PLATFORM PRELIMINARY DESIGN STUDY VOLUME 2..(U) GLOBAL MARINE DEVELOPMENT INC NEWPORT BEACH CA JUL 78 GMDI-040072-001-VOL-2 3/6

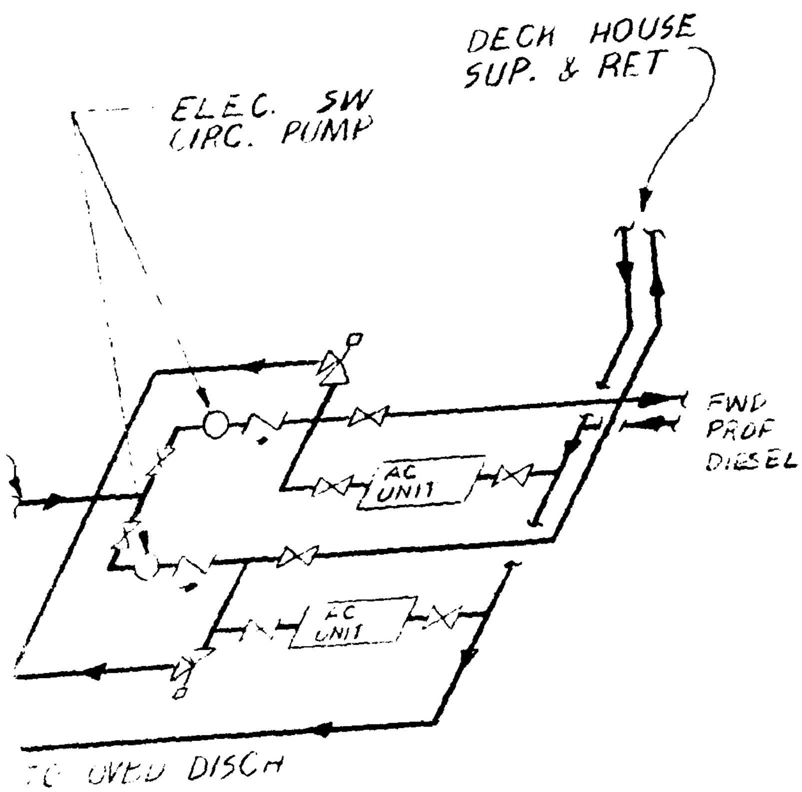
UNCLASSIFIED CHES/NAVFAC-FPO-1-78-9-PT-2 F/G 13/10 NL



MICROCOPY RESOLUTION TEST CHART

POSSIBLE.

5. LOW POINT DRAINS SHAL
6. ALL VALVES SHALL HAVE
7. PIPING IN COMPARTMEN
PREVENT SWEATING.
8. PROVIDE SUFFICIENT FL
BY ROUTING & PROPERL
9. THE OVERBOARD DISCHA
VALVES.
10. WHERE GALVANIZING IS
DAMAGED AREAS WITH G
11. PUMP CASING & SEA CH
MN DECK. THESE VENTS
& SEA CHESTS. (SEE V
12. EACH SEA CHEST STRAI
NOT LESS THAN 294 SQ
13. SYSTEM SHALL BE TEST
FOR PROPER OPERATION
14 PIPING TO BE ROUTED T
15. BRONZE VALVES W/SCRE
ARE GALVANICALLY ISO
UNIONS (EPCO, OR SI



ETAIL A 2ND DK

NO	DATE	

NO REQ'D		NEXT ASSEMBLY
		ALTERATION
		DATE
		SHIPYARD
		LOS ANGELES

YFNB HU

LINE, PIPE BETWEEN SEA VALVE & SHELL SHALL BE AS SHORT AS POSSIBLE.

5. LOW POINT DRAINS SHALL BE FITTED WITH BOSSES & GATE VALVES.
6. ALL VALVES SHALL HAVE ENGRAVED LABEL PLATES.
7. PIPING IN COMPARTMENTS SHALL BE INSULATED & LAGGED TO PREVENT SWEATING.
8. PROVIDE SUFFICIENT FLEXIBILITY AGAINST WORKING OF THE SHIP BY ROUTING & PROPERLY SUPPORTING THE PIPING.
9. THE OVERBOARD DISCHARGE LINES SHALL INCLUDE SWING CHECK VALVES.
10. WHERE GALVANIZING IS DESTROYED BY WELDING, CLEAN & COAT DAMAGED AREAS WITH GALVALLOYD.
11. PUMP CASING & SEA CHESTS SHALL BE VENTED TO ATM. ABOVE MN DECK. THESE VENTS SHALL BE VALVED AT THE PUMP CASING & SEA CHESTS. (SEE VIEW "A", SHT.1)
12. EACH SEA CHEST STRAINER PLATE SHALL HAVE A CLEAR AREA OF NOT LESS THAN 294 SQUARE INCHES.
13. SYSTEM SHALL BE TESTED UNDER NORMAL OPERATING CONDITIONS FOR PROPER OPERATION & UNOBSTRUCTED FLOW.
14 PIPING TO BE ROUTED TO SUIT CONDITIONS ONBOARD SHIP .
15. BRONZE VALVES W/SCREWED ENDS MAY BE USED ONLY IF THEY ARE GALVANICALLY ISOLATED FROM STEEL PIPE BY DIELECTRIC UNIONS (EPCO, OR SIMILAR) IF NOT, IBBM VALVES MUST BE USED.

NO	DATE	BY	DESCRIPTION	APPROVED

ALTERATIONS

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Los Angeles, Calif.

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NAVFAC (FPO-1)

WEST COAST OCEAN CONSTRUCTION PLATFORM

YFNB HULL CONVERSION SALT WATER COOLING SYSTEM

NEXT ASSEMBLY
ALTERATION
DATE
IPYARD
S ANGELES
CHNICAL SERVICES
RCHASING
TIMATING
CG

ENGR.

SCALE:

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16" .00 = ± .03
DECIMAL

11

15. BRONZE VALVE W...
ARE GALVANICALLY ISO... STEEL PIPE BY DI
UNIONS (EPCO, OR SIM... IBBM VALVES M

NO	DATE	BY	DESCRIPTION

ALTERATIONS

GLOBAL M
DEVELOPME
Los Angeles, Calif.

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THE PRIOR WRITTEN CONSENT OF GLOBAL MARINE DEVELOPMENT, INC. THE
TO GLOBAL MARINE DEVELOPMENT, INC. ON REQUEST.

NAVFAC (FPO-1)
WEST COAST OCEAN CONSTRUCTIO
YFNB HULL CONVERSION SALT WATER C

	NO REQ'D		NEXT ASSEMBLY
			ALTERATION
			DATE
			SHIPYARD
			LOS ANGELES
			TECHNICAL SERVICES
			PURCHASING
			ESTIMATING
			USCG
			ABS

		DATES
ENGR.	[illegible]	4-20-7?
DFT.	[illegible]	4-20-7?
CHK.	[illegible]	4-22-7?
APPR.	[illegible]	
REL.	[illegible]	[illegible]

SCALE:

JOB AUTH.

TOLERANCE
FRACTION ± 1/
ANGULAR ± ½°

DWG. NO.
D 40

17

VEPCO, OR SIMILAR, IF NOT, IBBM VALVES MUST BE USED.

NO	DATE	BY	DESCRIPTION	APPROVED

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WEST COAST OCEAN CONSTRUCTION PLATFORM

YFNB HULL CONVERSION SALT WATER COOLING SYSTEM

	DATES
ENGR.	
DFT.	
CHK.	4-22-79
APPR.	
REL.	6/14/79

SCALE:

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16" DECIMAL .00 = ± .03
ANGULAR ± ½° .000 = ± .010

JOB AUTH.	DWG. NO.	ALT
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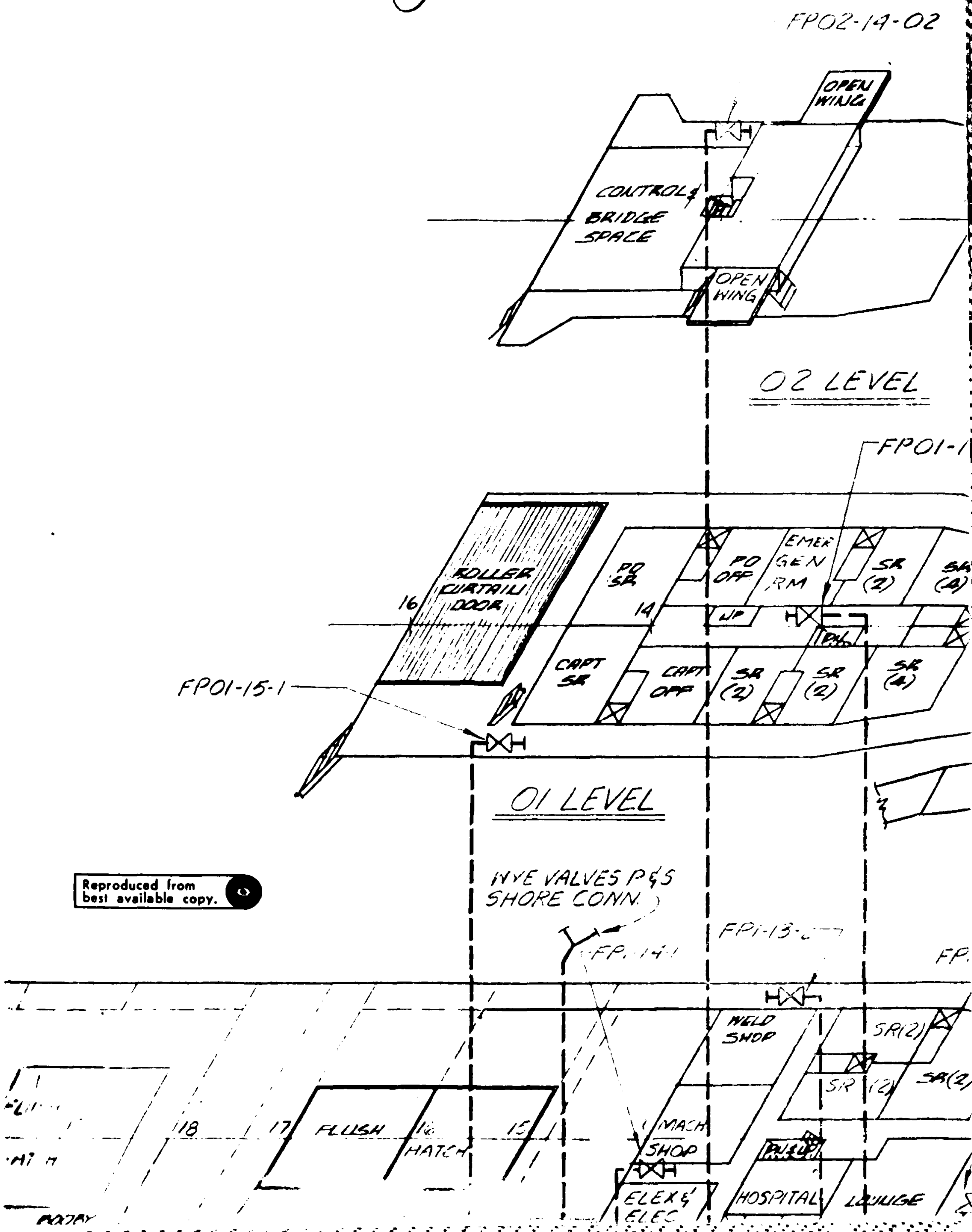
7



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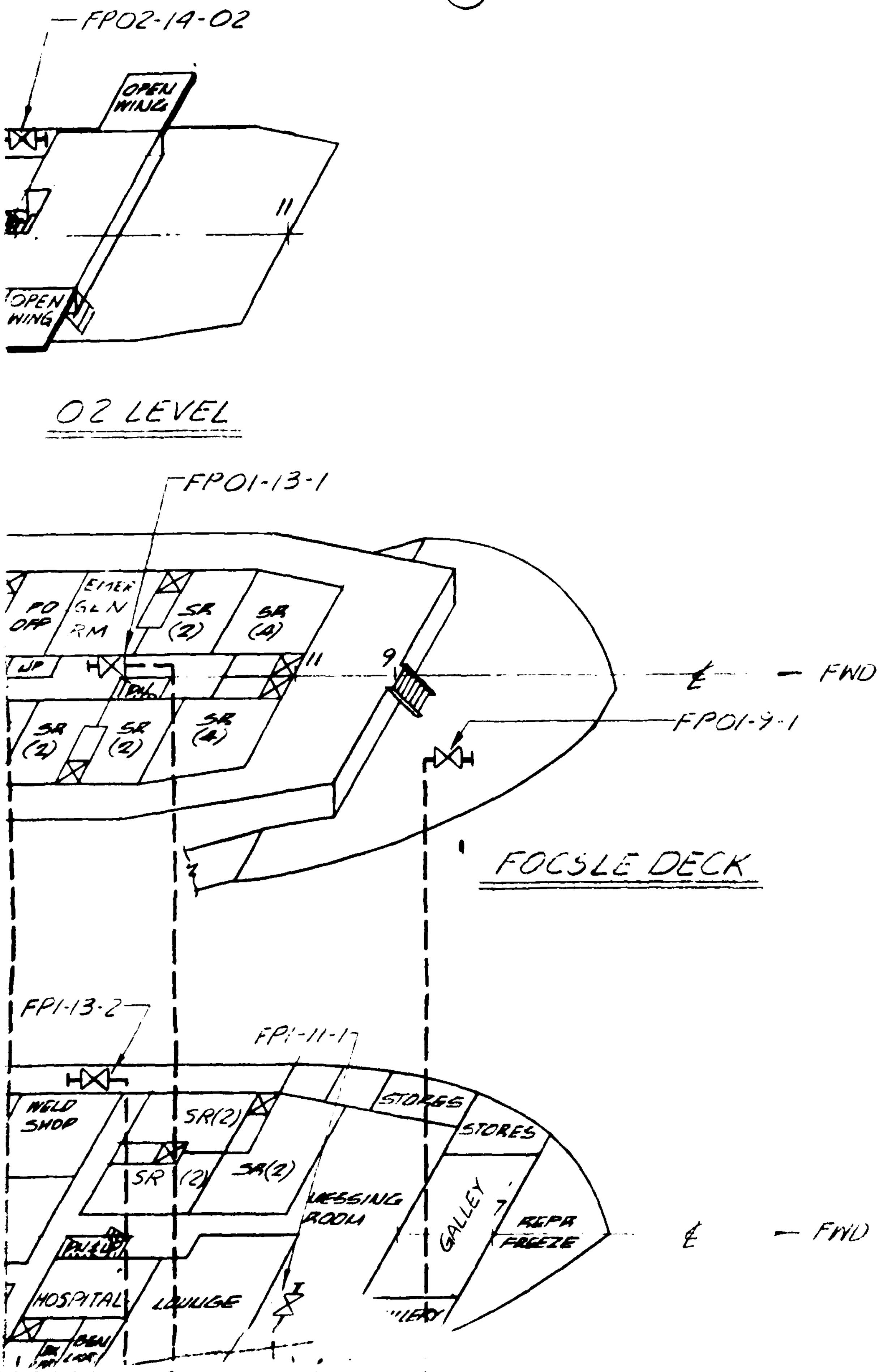
2



FP02-14-02
OPEN WING
11
OPEN WING
02 LEVEL
FP01-13-1
PO OFF
EMER GEN RM
SR (2)
SR (4)
SR (2)
SR (2)
SR (4)
9
11
FWD
FP01-9-1
FOCSLE DECK
FP1-13-2
FP1-11-1
WELD SHOP
SR(2)
SR (2)
SR(2)
STORES
STORES
MESSING ROOM
GALLEY
7
REFR FREEZE
FWD
HOSPITAL
LOUNGE

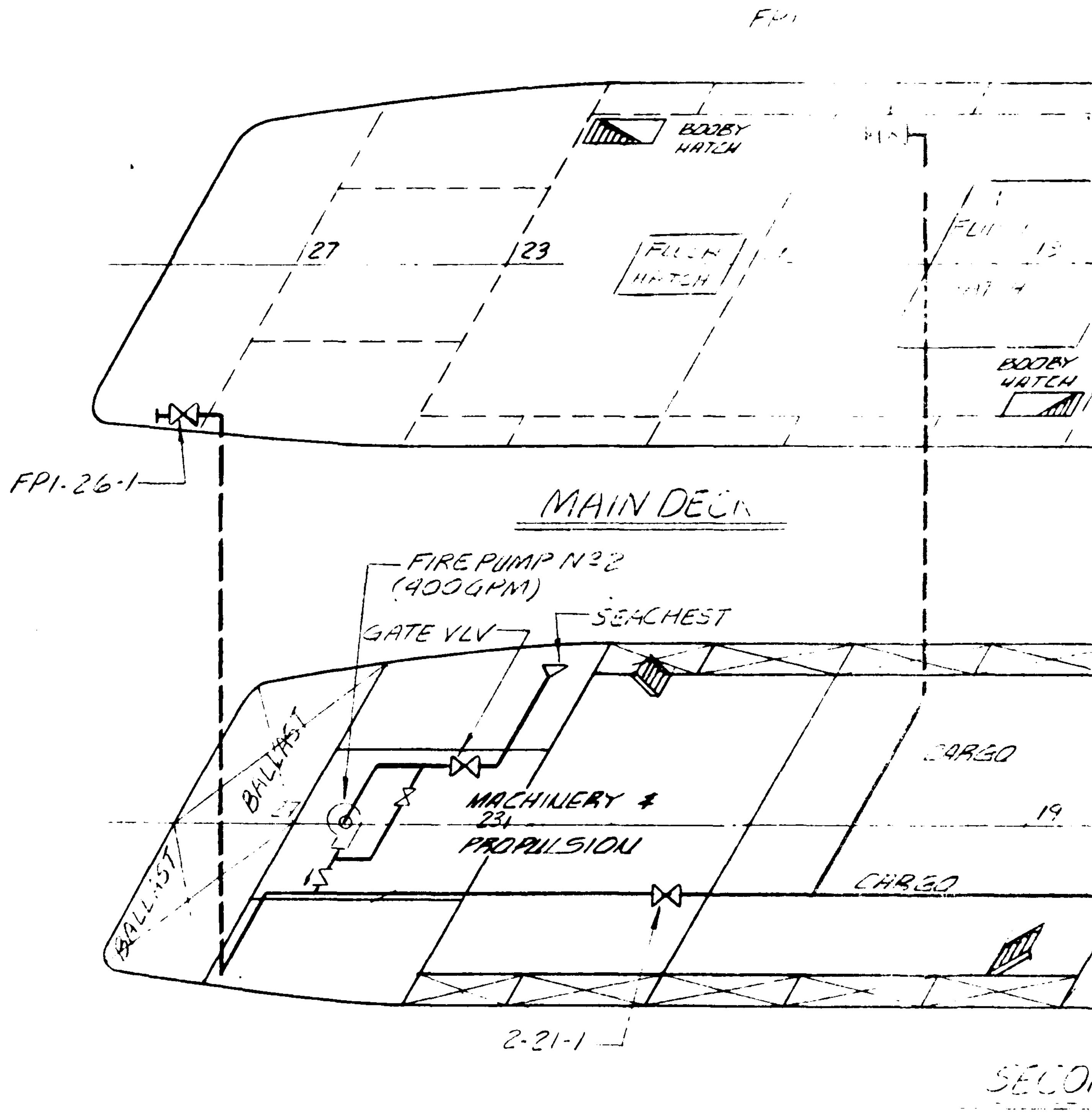
LIST OF MATERIALS

ITEM	QTY	DESCRIPTION	MATERIAL

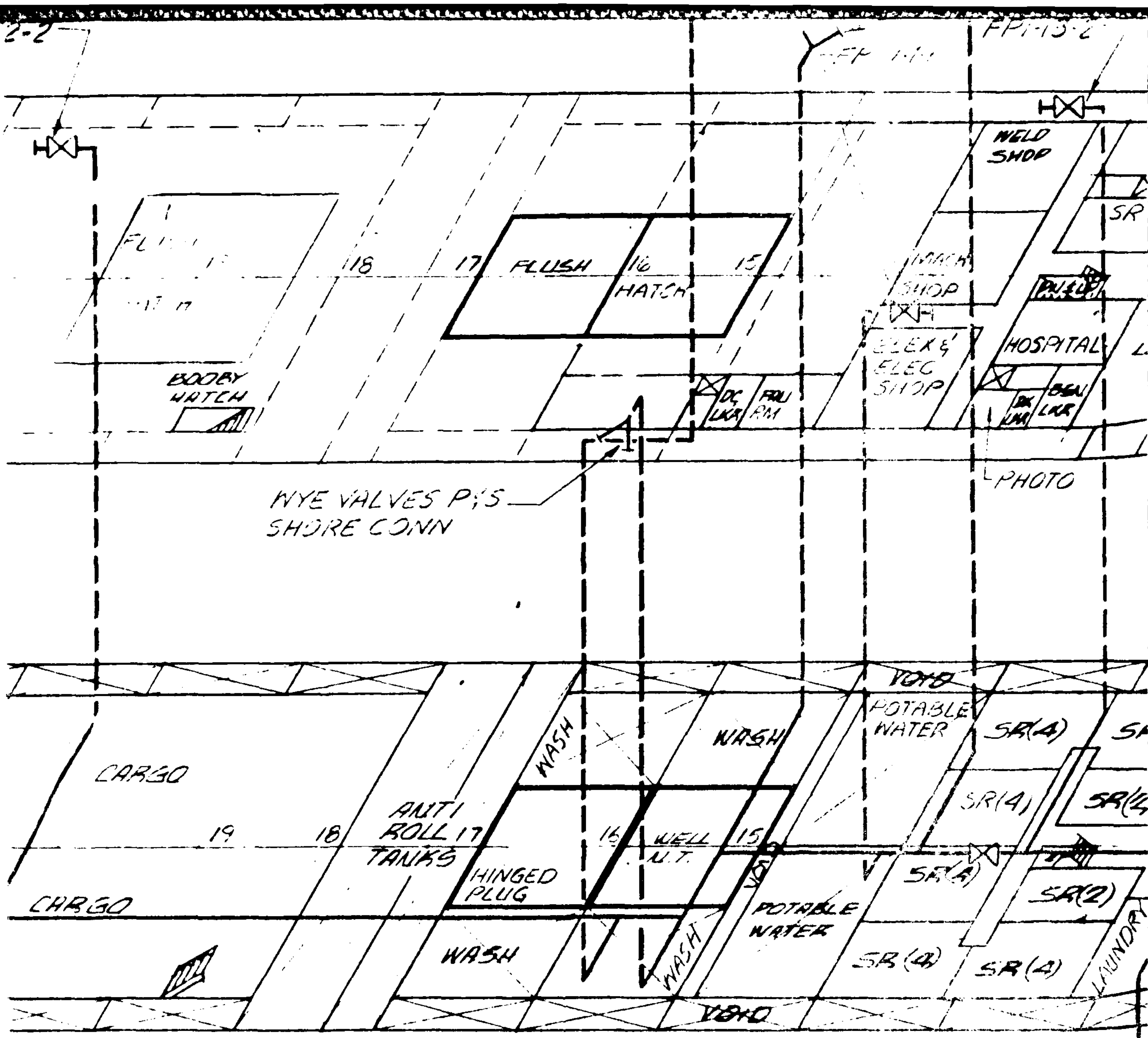
3

GENERAL NOTES:

1. MATERIAL, WORKMANSHIP & INSTALLATION SHALL MEET USCG REQUIREMENTS.
2. ALL PARTS OF THE FIRE MAIN LOCATED ON EXPOSED DECKS SHALL BE INSULATED & LAGGED TO PREVENT FREEZING OF STATIONS.
3. EACH FIRE STATION TO HAVE A SINGLE LENGTH OF HOSE OF THE SIZE INDICATED ON TABLE, COMPLETE WITH APPROVED NOZZLE, SPANNER, CAPS & CHAINS AND A SUITABLE HOSE RACK IS TO BE PROVIDED.
4. EXTERIOR HOSE & NOZZLES TO BE PROTECTED WITH APPROVED GALVANIZED STEEL HOUSING.
5. NATIONAL STD FIRE HOSE COUPLING THREAD SHALL BE USED FOR THE 1-1/2" & 2-1/2" SIZES. (9 THD/IN FOR THE 1-1/2" SIZE & 7-1/2" THD/IN FOR 2-1/2" SIZE.
6. EACH FIRE HYDRANT SHALL BE IDENTIFIED IN RED LETTERS & FIGURES AT LEAST 2" HIGH.
7. ACCOMMODATION & SERVICE AREAS OF THE SHIP SHALL BE PROVIDED WITH TWO COMBINATION NOZZLES & SUITABLE APPLICATORS.
8. STRAINER BASKETS SHALL BE MADE OF STAINLESS STEEL.
9. PIPING SUBJECT TO MOVEMENT DUE TO WORKING OF THE SHIP, SHALL BE FITTED WITH "U" BENDS, OR OTHER MEANS SHALL BE PROVIDED TO PREVENT DAMAGE TO THE PIPING.
10. DECK & BULKHEAD PENETRATIONS SHALL BE FITTED WITH DOUBLER PLATES OR SLEEVES.
11. WHERE POSSIBLE, PIPING SHALL BE INSTALLED BEHIND SHEATHING.
12. 50 FT. LENGTHS OF 1-1/2" RUBBER WASHDOWN HOSES COMPLETE WITH NOZZLES, FITTINGS AND STORAGE REELS ARE TO BE PROVIDED. THE RACKS TO BE LOCATED NEAR FIREMAN STATIONS.
13. FIRE AXES & STOWAGE FOR SAME IS TO BE PROVIDED NEAR FIRE STATION.
14. ALL GALVANIZED PIPING DAMAGED BY WELDING SHALL HAVE THE DAMAGED AREA THOROUGHLY CLEANED AND THEN COATED WITH GALVALLOYD.
15. ALL FIRE STATIONS SHALL BE PROVIDED WITH HOSE RACKS AND EXTERIOR STATIONS SHALL ALSO HAVE GALVANIZED METAL HOSE BOXES.
16. FWD. FIRE PUMP IS TO BE POWERED FROM EMERGENCY SWITCHBOARD. MOTOR TO BE EXPLOSION PROOF.
17. ALL BRONZE VALVES TO BE GALVANICALLY ISOLATED USING INSULATING GASKETS PLASTIC WASHERS & BOLT SLEEVES.
18. HOSE VALVES WITHOUT HOSES ATTACHED SHALL HAVE CAP AND CHAIN AFFIXED.
19. BRONZE VALVES MAY BE USED IF INSULATED FROM STEEL PIPE WITH DIELECTRIC INSULATING UNIONS.

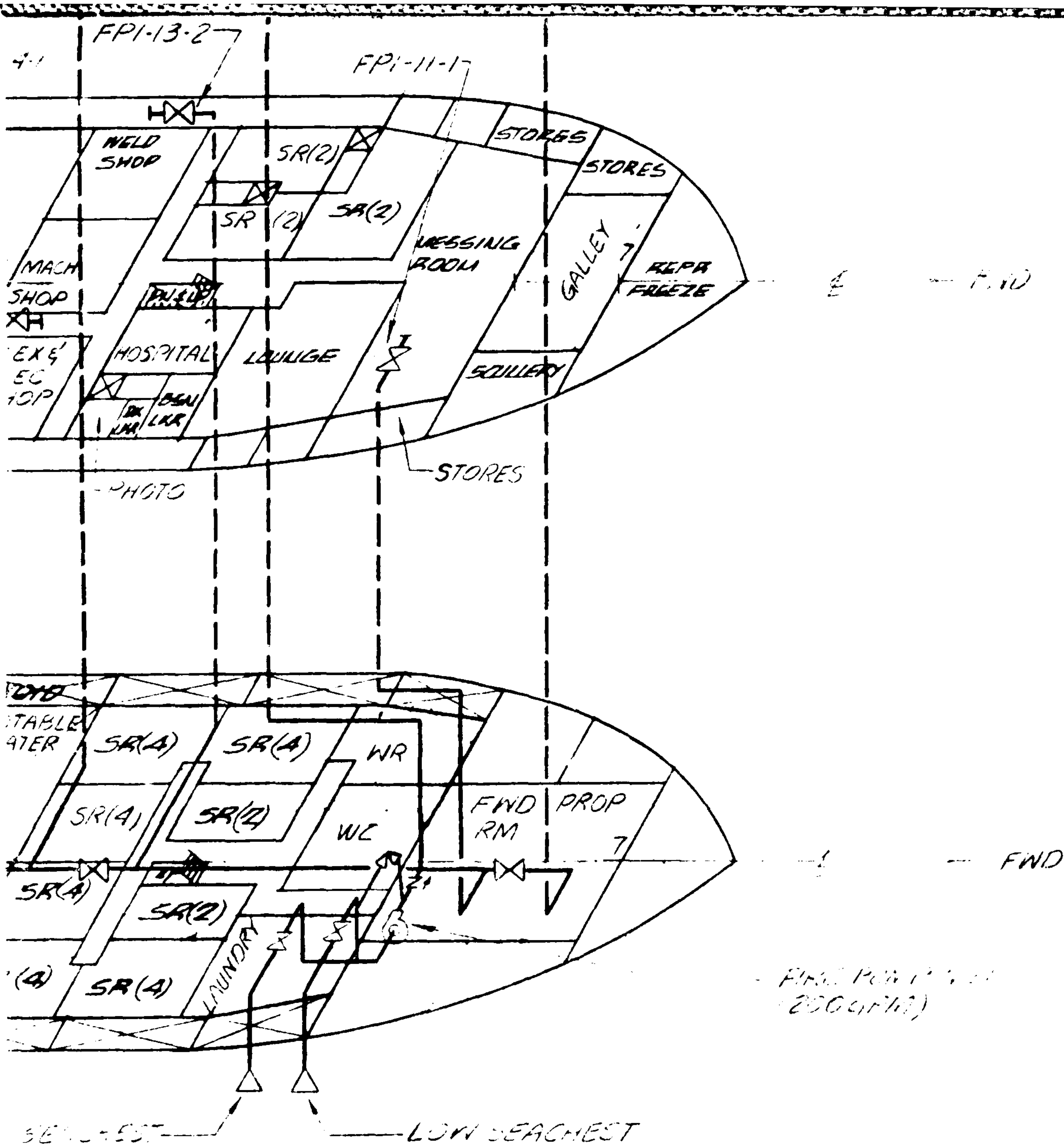

BOOBY HATCH
27
23
FLUSH HATCH
BOOBY HATCH
FP1-26-1
MAIN DECK
FIRE PUMP Nº 2 (400GPM)
SEACHEST
GATE VLV
BALLAST
BALLAST
BALLAST
MACHINERY &
231
PROPULSION
CARGO
19
CARGO
2-21-1

4



SECOND DECK

5


FP1-13-2
FP1-11-1
WELD SHOP
SR(2)
STORES
STORES
SR (2)
SR(2)
MACH SHOP
ROOM
GALLEY
REFR FREEZE
HOSPITAL
LOUNGE
SCULLERY
BSN LKR
STORES
PHOTO
SR(4)
SR(4)
WR
SR(4)
SR(2)
WC
FWD RM
PROP
FWD
SR(4)
SR(2)
LAUNDRY
SR(4)
LOW SEACHEST

(6)

FWD

FWD

GALVALLOYD.

15. ALL FIRE STATIONS SHALL
EXTERIOR STATIONS SHALL
BOXES.

16. FWD. FIRE PUMP IS TO BE
MOTOR TO BE EXPLOSION P

17. ALL BRONZE VALVES TO B
INSULATING GASKETS PLA

18. HOSE VALVES WITHOUT HO
AND CHAIN AFFIXED.

19. BRONZE VALVES MAY BE U
WITH DIELECTRIC INSULA

RESERVATION

THIS DRAWING IS FOR ESTIMA

NO	DATE	BY

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THIS DRAWING AND THE DESIGN IT
AND MAY NOT BE REPRODUCED O
THE PRIOR WRITTEN CONSENT
TO GLOBAL MARINE DEVELOPME

WEST COAST O
YF HULL C

NO REQ'D		NEXT ASSEMBLY
		ALTERATION
		DATE
		SHIPYARD
		LOS ANGELES
		TECHNICAL SERVICES
		PURCHASING
		ESTIMATING
		USCG
		ABS

		DATES
ENGR.	[illegible]	[illegible]
DFT.	[illegible]	[illegible]
CHK.	[illegible]	[illegible]
APPR.		
REL.	[illegible]	[illegible]

GALVALLOYD.

5. ALL FIRE STATIONS SHALL BE PROVIDED WITH HOSE RACKS AND EXTERIOR STATIONS SHALL ALSO HAVE GALVANIZED METAL HOSE BOXES.

6. FWD. FIRE PUMP IS TO BE POWERED FROM EMERGENCY SWITCHBOARD. MOTOR TO BE EXPLOSION PROOF.

7. ALL BRONZE VALVES TO BE GALVANICALLY ISOLATED USING INSULATING GASKETS PLASTIC WASHERS & BOLT SLEEVES.

8. HOSE VALVES WITHOUT HOSES ATTACHED SHALL HAVE CAP AND CHAIN AFFIXED.

9. BRONZE VALVES MAY BE USED IF INSULATED FROM STEEL PIPE WITH DIELECTRIC INSULATING UNIONS.

RESERVATION

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NAVFAC (FPO-1)
WEST COAST OCEAN CONSTRUCTION PLATFORM
YFN/B HULL CONVERSION - FIREMAIN SYSTEM

MBLY
ION
RVICES

		DATES
ENGR.	[illegible]	4-20-78
DFT.	[illegible]	4-[illegible]
CHK.	[illegible]	4-21-78
APPR.	[illegible]	[illegible]
REL.	[illegible]	[illegible]

SCALE: NONE

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16"
DECIMAL .00 = ± .03
.000 = ± .010
ANGULAR ± 1/2°

JOB AUTH. [illegible]

DWG. NO. D • 4072 • R00[illegible]

ALT

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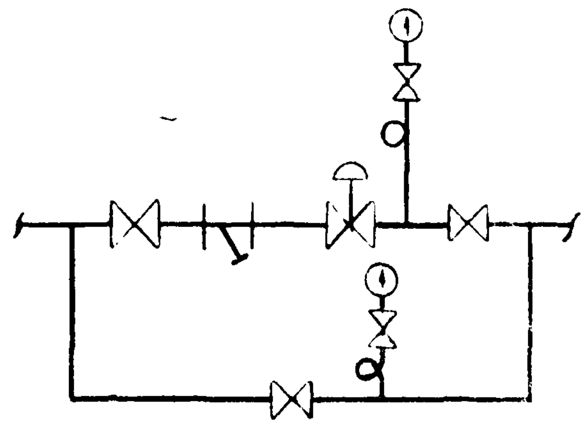

DETAIL "A"

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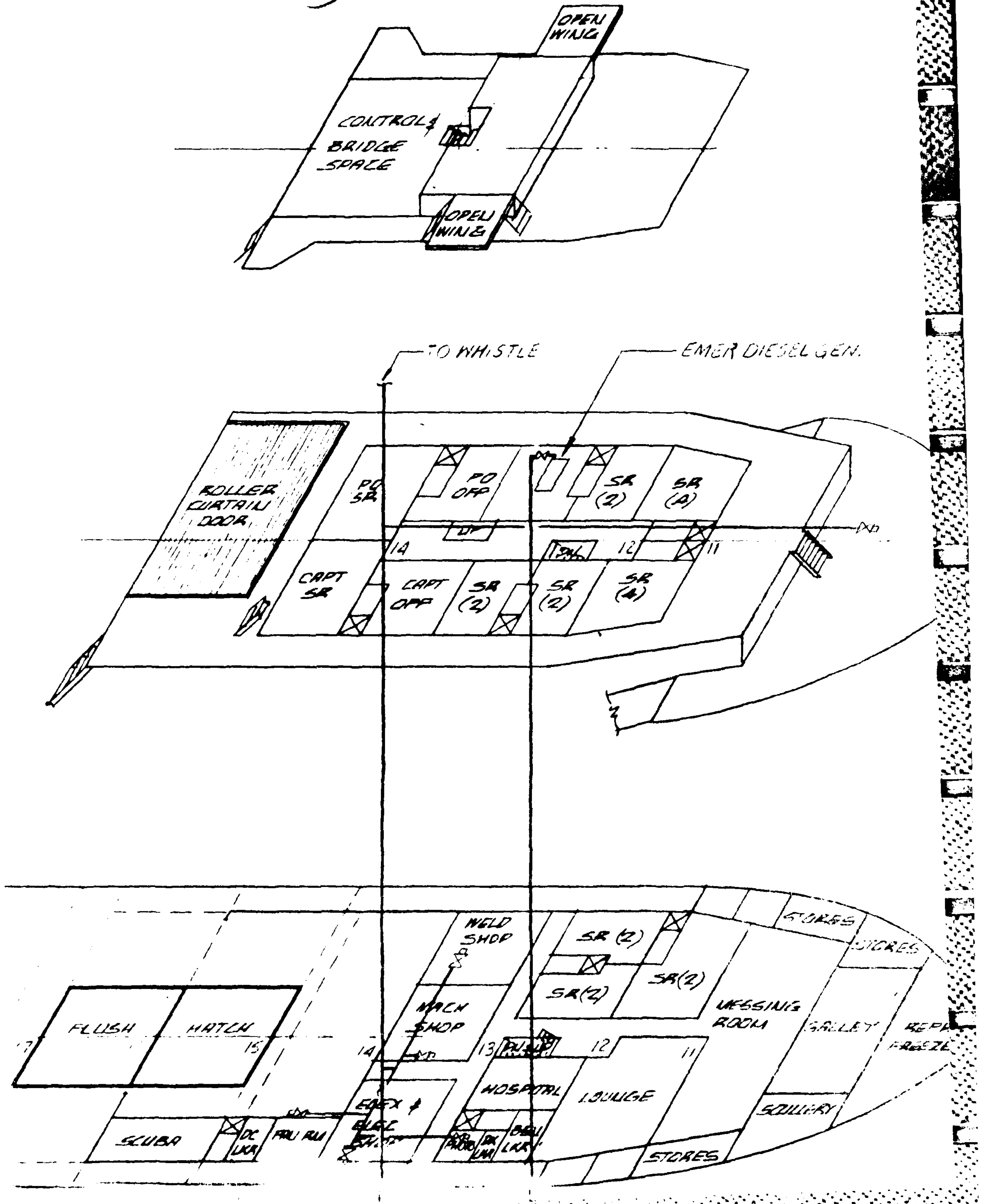
(2)



OPEN WING
CONTROL &
BRIDGE
SPACE
OPEN WING
TO WHISTLE
EMER DIESEL GEN.
ROLLER CURTAIN DOOR
PO SR
PO OFF
SR (2)
SR (4)
14
12
11
CAPT SR
CAPT OFF
SR (2)
SR (2)
SR (4)
WELD SHOP
SR (2)
STORES
STORES
SR(2)
SR(2)
MESSING ROOM
MACH SHOP
GALLEY
FLUSH
HATCH
17
15
14
13
12
11
HOSPITAL
LOUNGE
SCULLERY
SCUBA
DC LKR
FAN RM
DK LKR
STORES

13

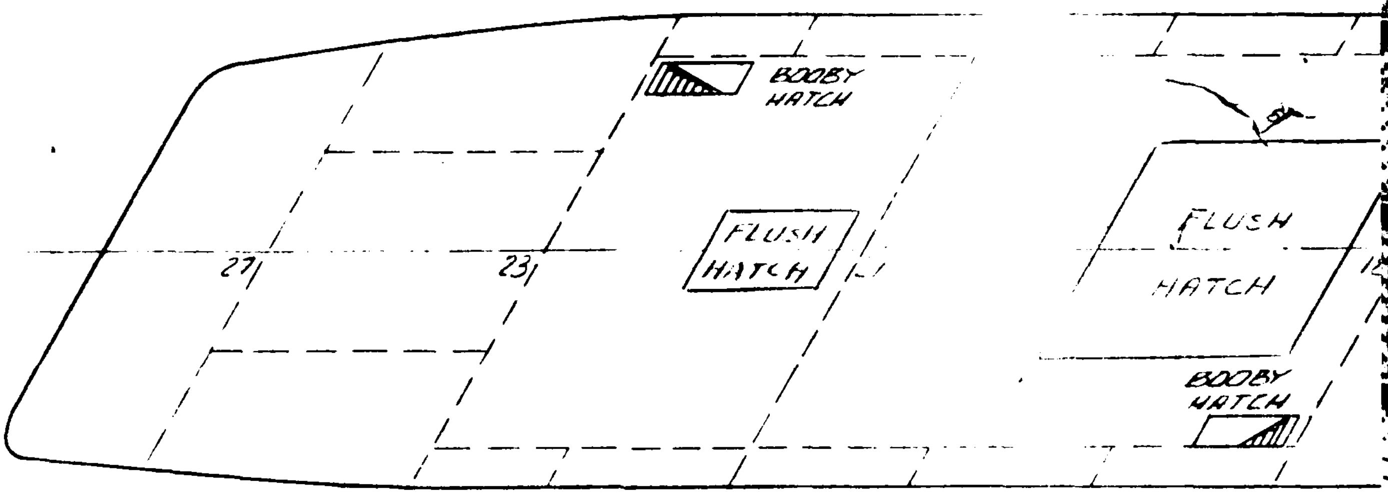
LIST OF MATERIALS

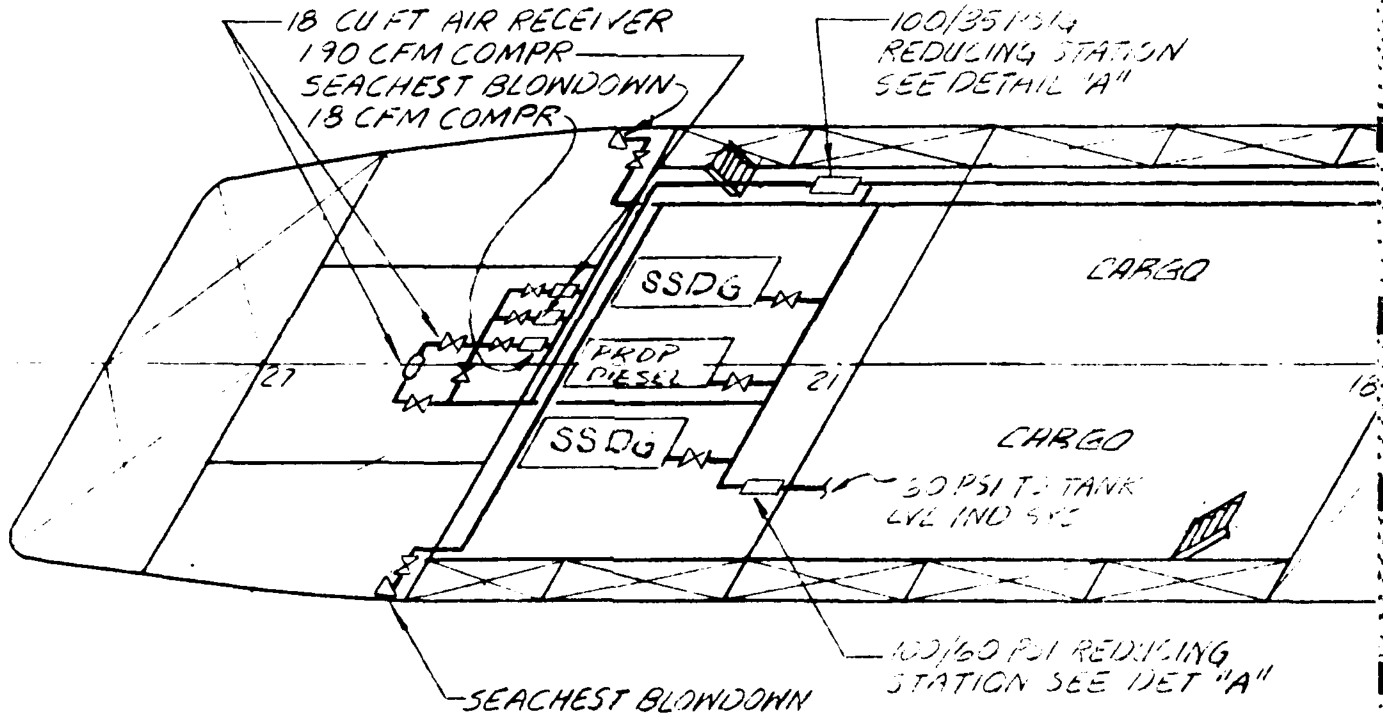
ITEM	QTY	DESCRIPTION	MATERIAL

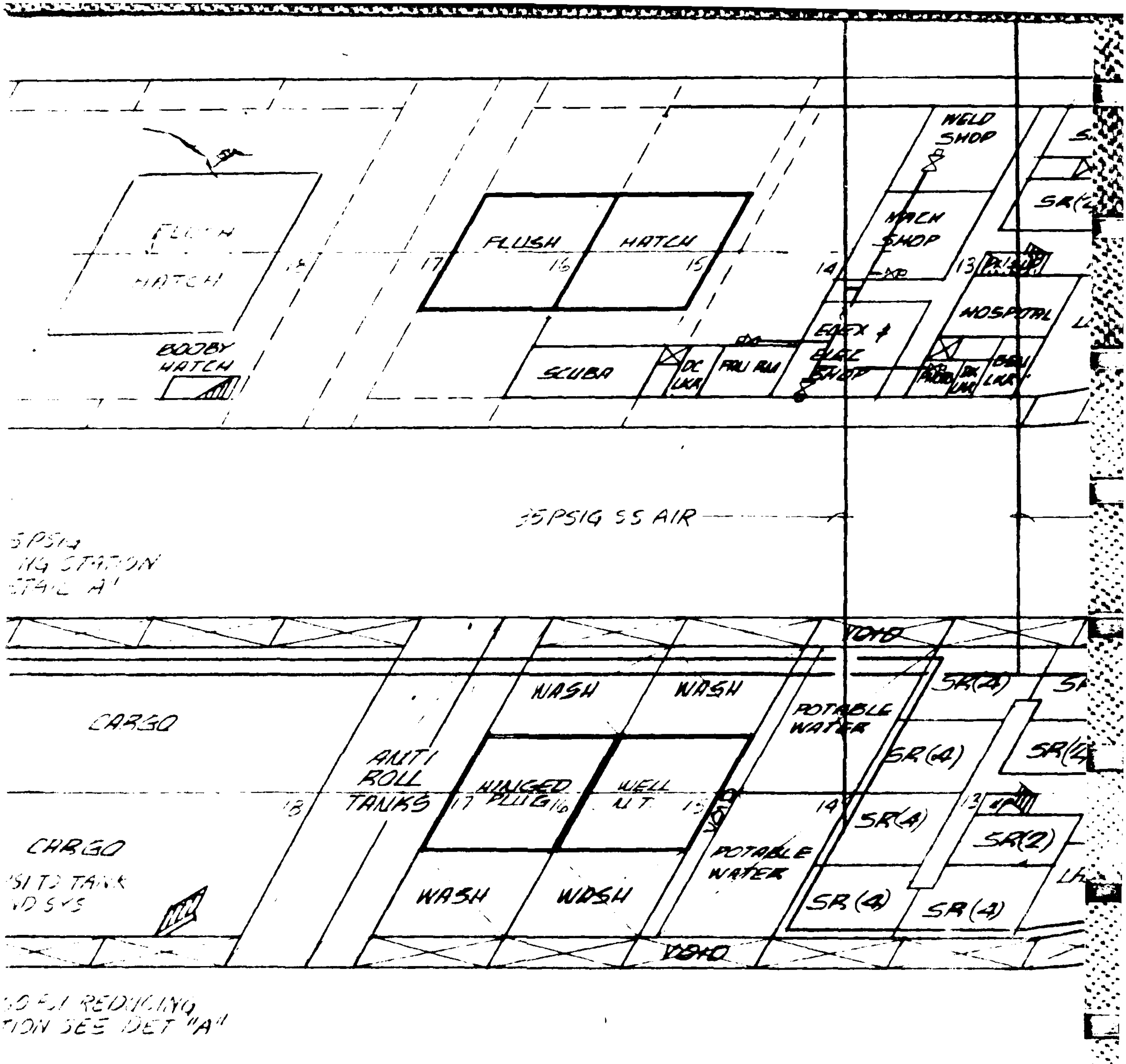
GENERAL NOTES:

1. ALL PIPING TO BE ADEQUATELY STAYED & SUPPORTED.
2. ALL BRONZE VALVES CONNECTED TO FERROUS PIPING WHICH ARE SUBJECTED TO SALT WATER SHALL BE GALVANICALLY ISOLATED USING INSULATING GASKETS, PLASTIC WASHERS AND PLASTIC BOLT SLEEVES.
3. ROUTE ALL PIPING TO GIVE MAXIMUM PROTECTION FROM DAMAGE.
4. ALL PIPING SHALL BE BLOWN DRY WITH AIR AFTER HYDROSTATIC TESTING.
5. ALL PIPING & VALVES TO BE APPROVED BY USCG.
6. EXTRA HEAVY SPOOLS TO BE INSTALLED AND WELDED WHERE PIPING PENETRATES WATER TIGHT BULKHEADS & DECKS.
7. ALL LOW POINTS IN THE SYSTEM SHALL HAVE AUTOMATIC CONDENSATE DRAINS.

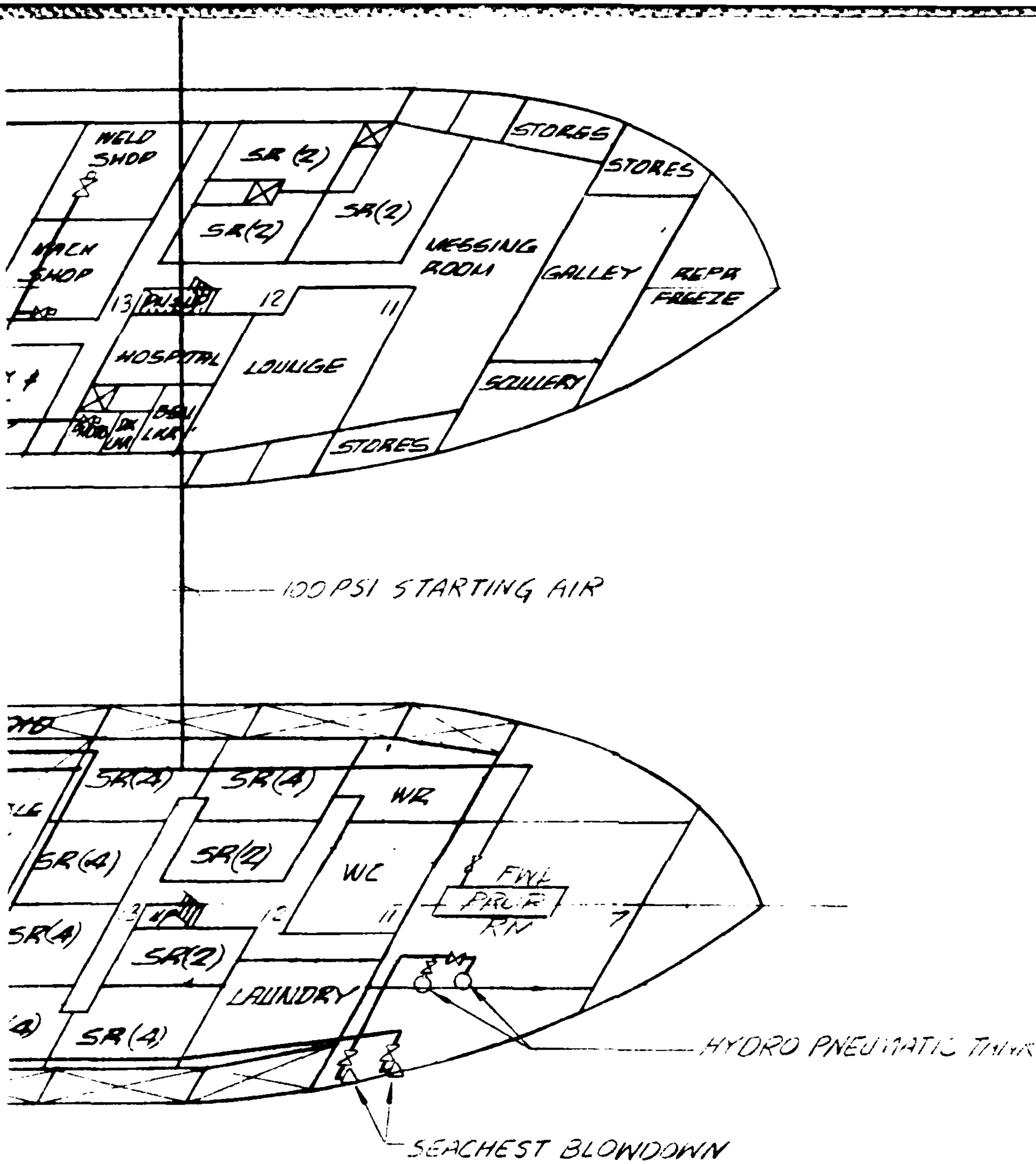
SYMBOLS	
	GATE VALVE


BOOBY HATCH
FLUSH HATCH
27
23
FLUSH HATCH
BOOBY HATCH


18 CU FT AIR RECEIVER
190 CFM COMPR
SEACHEST BLOWDOWN
18 CFM COMPR
100/35 PSIG REDUCING STATION SEE DETAIL "A"
SSDG
PROP DIESEL
SSDG
CARGO
CARGO
27
21
16
60 PSI TO TANK LVL IND SYS
100/60 PSI REDUCING STATION SEE DET "A"
SEACHEST BLOWDOWN


WELD SHOP
MACH SHOP
FLUSH HATCH
FLUSH
HATCH
BOOBY HATCH
SCUBA
DC LKR
HOSPITAL
35PSIG SS AIR
CARGO
ANTI ROLL TANKS
WASH
WASH
HINGED PLUG
WELL NT
POTABLE WATER
POTABLE WATER
SR(4)
SR(4)
SR(4)
SR(4)
SR(4)
SR(4)
SR(2)
VOID
VOID
VOID
CARGO
TION SEE DET "A"

5


WELD SHOP
SR (2)
SR(2)
SR(2)
STORES
STORES
MACH SHOP
MESSING ROOM
GALLEY
REFR FREEZE
13
12
11
HOSPITAL
LOUNGE
SCULLERY
STORES
100 PSI STARTING AIR
SR(4)
SR(4)
WR
SR(4)
SR(2)
WC
FWE PROP RM
SR(4)
12
11
7
SR(2)
LAUNDRY
SR (4)
HYDRO PNEUMATIC TANK
SEACHEST BLOWDOWN

Symbol	Description
	GLOBE VALVE
	STO[illegible] VALVE
	RELIEF VALVE
	PRESSURE REDUCING VALVE
	PRESSURE GAGE

RESERVATION

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NO	DATE	BY	DESCRIPTION
			ALTERATIONS

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DEVELOPM[ENT]
Los Angeles, Cal[ifornia]

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NAVFAC (FPO-1)

WEST COAST OCEAN CONSTRUCTION

YFNB HULL CONVERSION - COMPRESS

NO REQ'D	NEXT ASSEMBLY
	ALTERATION
	DATE
	SHIPYARD
	LOS ANGELES
	TECHNICAL SERVICES
	PURCHASING
	ESTIMATING
	USCG
	ABS

		DATES
ENGR.	BF	4-20-78
DFT.	[illegible]	4-24-78
CHK.	J.G	4-22-78
APPR.	[illegible]	
REL.	[illegible]	6/14/78

SCALE: NONE

TOLERANCE
FRACTION ±
ANGULAR ±

JOB AUTH. 04972 01000

DWG. NO. D •4

(7)

	GATE VALVE
	GLOBE VALVE
	STOPCHECK VALVE
	RELIEF VALVE
	PRESSURE REDUCING VALVE
	PRESSURE GAGE

'ATION

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DATE	BY	DESCRIPTION	APPROVED

ALTERATIONS

GLOBAL MARINE DEVELOPMENT INC.

Los Angeles, Calif.

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NAVFAC (FPO-1)

WEST COAST OCEAN CONSTRUCTION PLATFORM

YFNB HULL CONVERSION - COMPRESSED AIR SYS.

	DATES	SCALE:	TOLERANCE UNLESS OTHERWISE NOTED
PF	4-20-78	NONE	FRACTION ± 1/16" DECIMAL .00 = ± .03
[illegible]	4-[illegible]-78		ANGULAR ± ½° .000 = ± .010
J.G	4-22-78	JOB AUTH. 04072 01000	DWG. NO. D • 4072 • P003 ALT A
[illegible]	[illegible]		
[illegible]	4/14/78		

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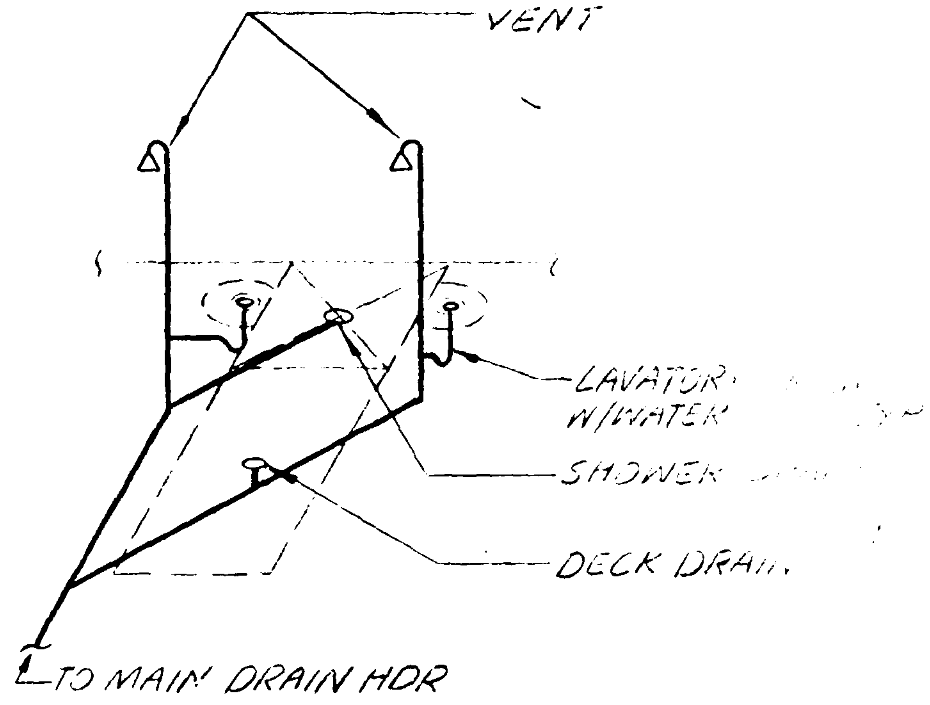
65



TYPICAL WR PLUMBING

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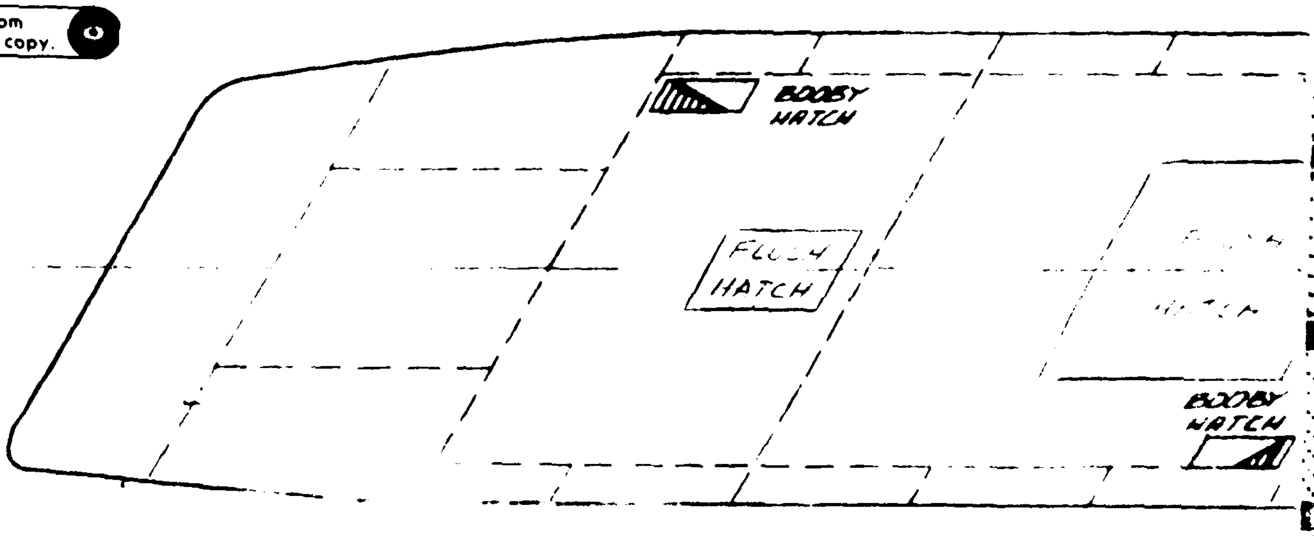
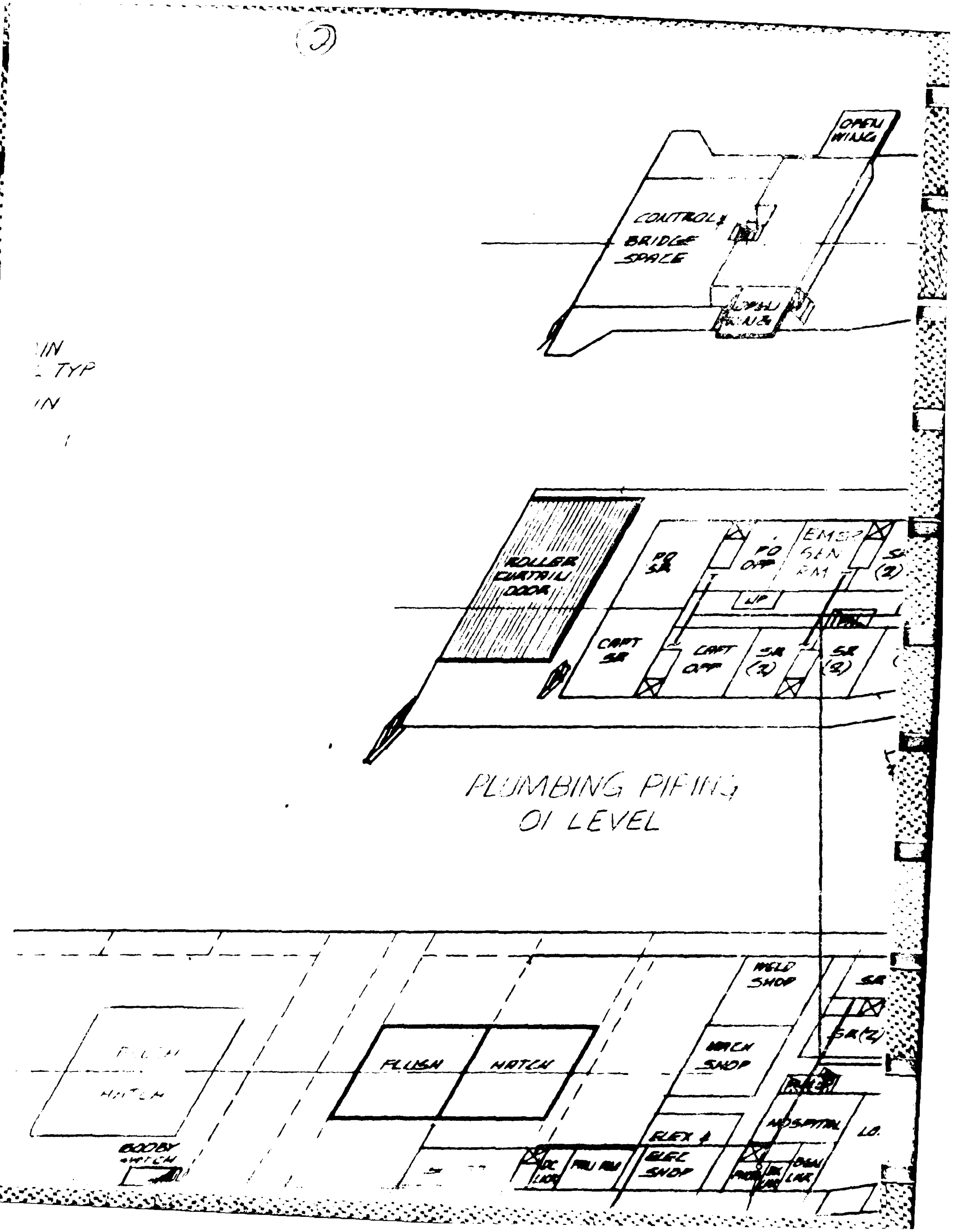
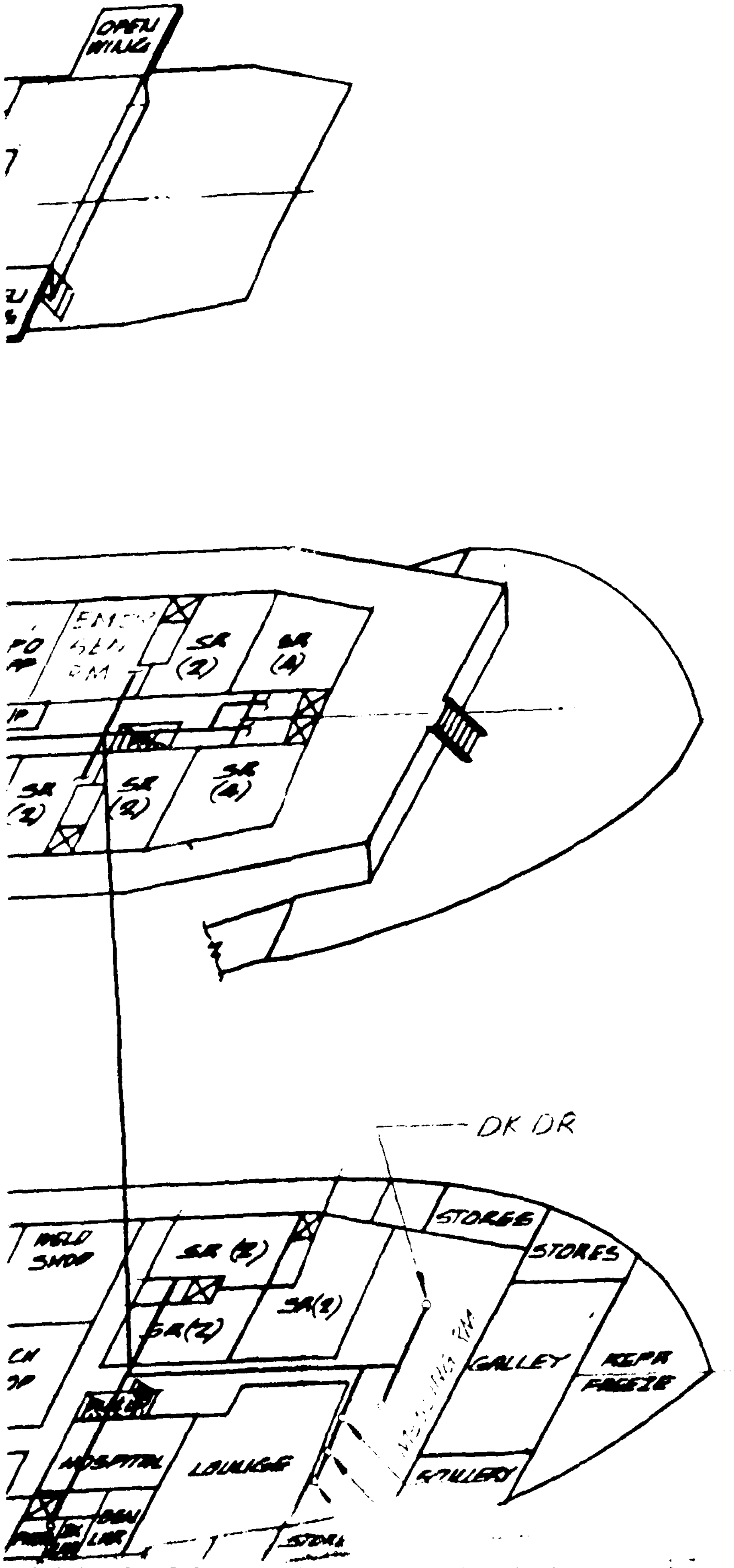




OPEN WING
CONTROL & BRIDGE SPACE
OPEN WING
TYP
ROLLER CURTAIN DOOR
PO SR
PO OFF
EMER GEN RM
CAPT SR
CAPT OFF
SR (2)
SR (2)
PLUMBING PIPING
01 LEVEL
WELD SHOP
MACH SHOP
HOSPITAL
ELEX & ELEC SHOP
FLUSH HATCH
FLUSH
HATCH
BOOBY HATCH

(3)


OPEN WING
EMER GEN RM
SR (2)
SR (4)
SR (2)
SR (2)
SR (4)
DK DR
STORES
STORES
WELD SHOP
SR (2)
SR (2)
SR (2)
GALLEY
REFR FREEZE
HOSPITAL
LOUNGE
SCULLERY

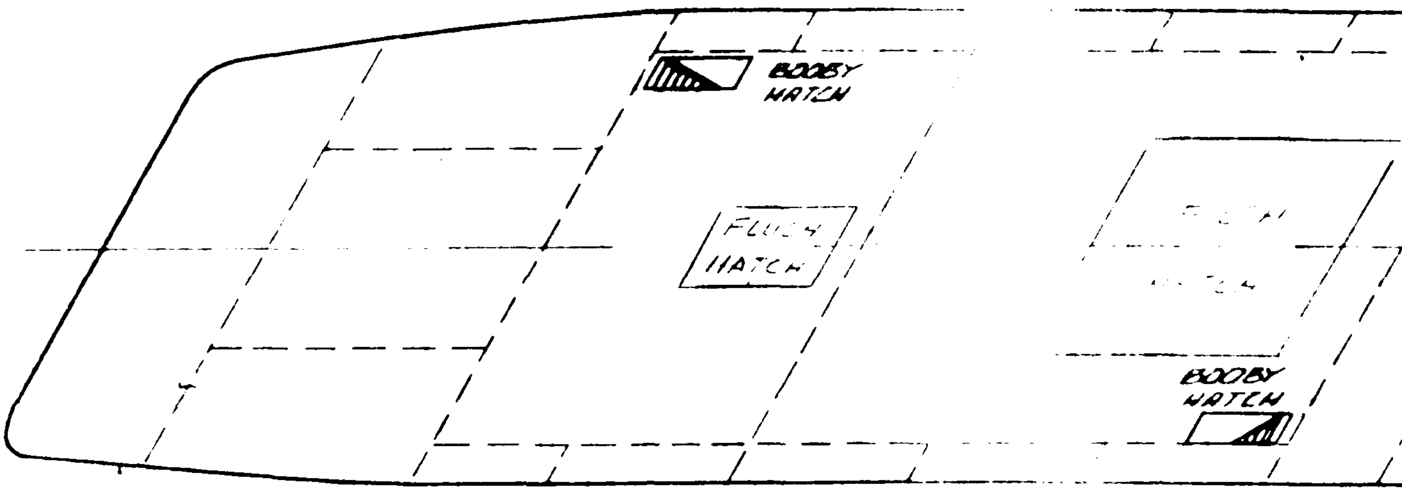
(4)

ITEM	QTY	DESCRIPTION	MATERIAL

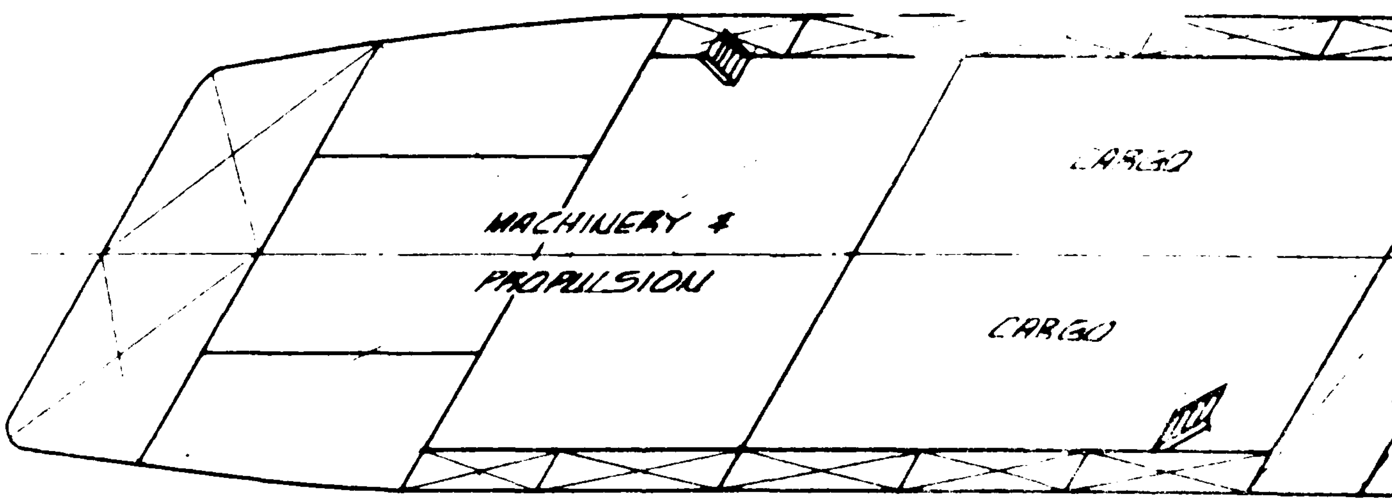
LIST OF MA[illegible]

GENERAL NOTES:

1. MATERIALS & WORKMANSHIP SHALL MEET ABS & USCG REQUIREMENTS.
2. DECK, BULKHEAD & SHELL PENETRATIONS SHALL BE FITTED WITH DOUBLER PLATES.
3. OVERBOARD DISCHARGES ARE TO BE LOCATED AT THE DEEPEST LOAD LINE. PIPE BETWEEN SEA VALVE & SHELL SHALL BE AS SHORT AS POSSIBLE.
4. LOW POINT DRAINS SHALL BE FITTED WITH BOSSES AND GATE VALVES.
5. PIPING IN COMPARTMENTS SHALL BE INSULATED & LAGGED TO PREVENT SWEATING.
6. PROVIDE SUFFICIENT FLEXIBILITY AGAINST WORKING OF THE SHIP BY ROUTING & PROPERLY SUPPORTING THE PIPING.
7. THE OVERBOARD DISCHARGE LINES SHALL INCLUDE SWING CHECK VALVES.
8. WHERE GALVANIZING IS DESTROYED BY WELDING, CLEAN & COAT DAMAGED AREAS WITH GALVALLOYD.
9. PUMP CASING & SEA CHESTS SHALL BE VENTED TO ATM. ABOVE MN DECK. THESE VENTS SHALL BE VALVED AT THE PUMP CASING & SEA CHESTS. (SEE VIEW "A" SHT.1)
10. EACH SEA CHEST STRAINER PLATE SHALL HAVE A CLEAR AREA OF NOT LESS THAN 234 SQUARE INCHES.
11. ALLOW MINIMUM OF 4 FEET STRAIGHT PIPE ON DISCHARGE OF EDUCTORS.
12. ALL BENDS ON EDUCTOR DISCHARGE PIPING SHALL BE MADE OF LONG RADIUS ELBOWS OR SHALL HAVE A RADIUS OF 5 TIMES The DIAMETER OF THE PIPE.
13. EDUCTORS ON DIAGRAM ARE SHOWN AS HORIZONTALLY

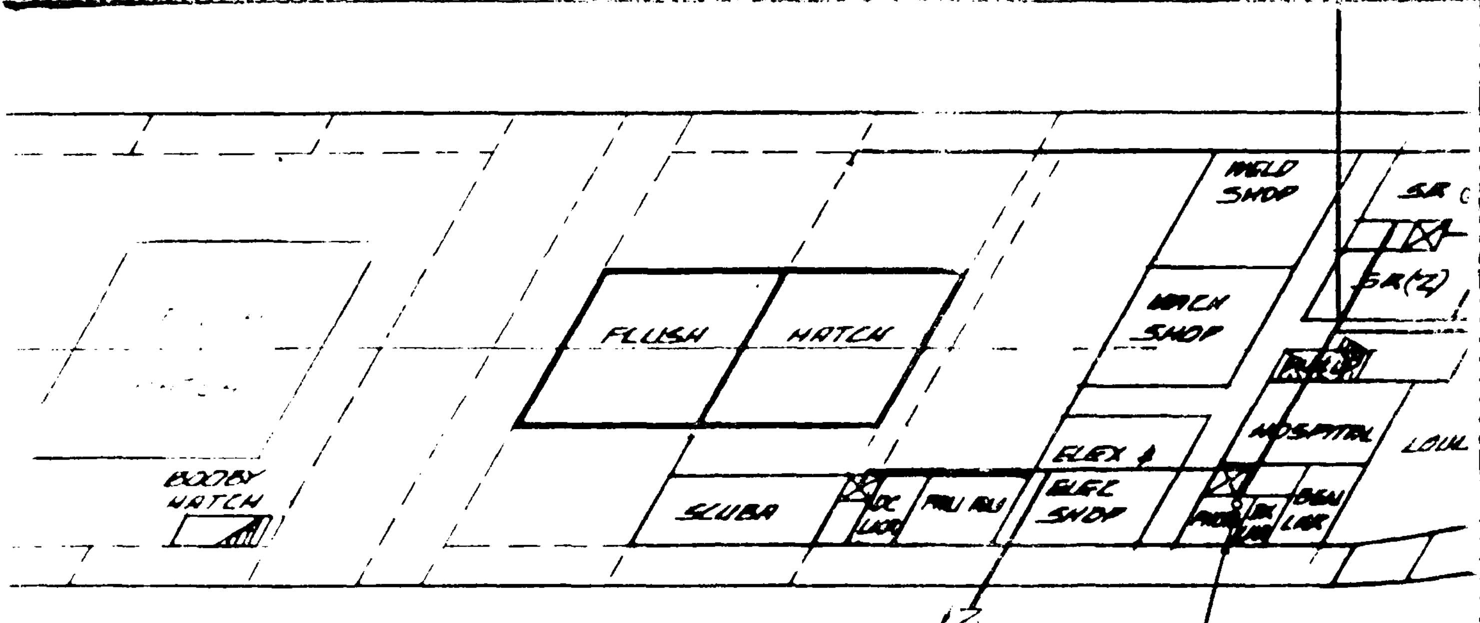


ABING & DEC
PI..., BELOW MAIN

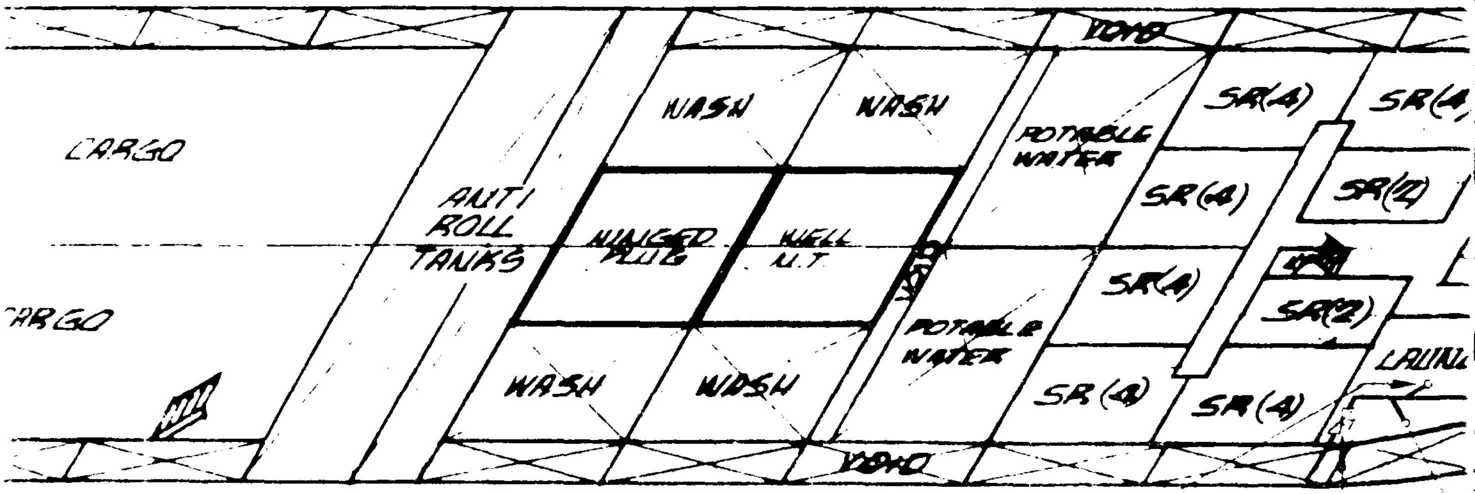


PLUMBING & DRAIN P
AT SECOND DECK

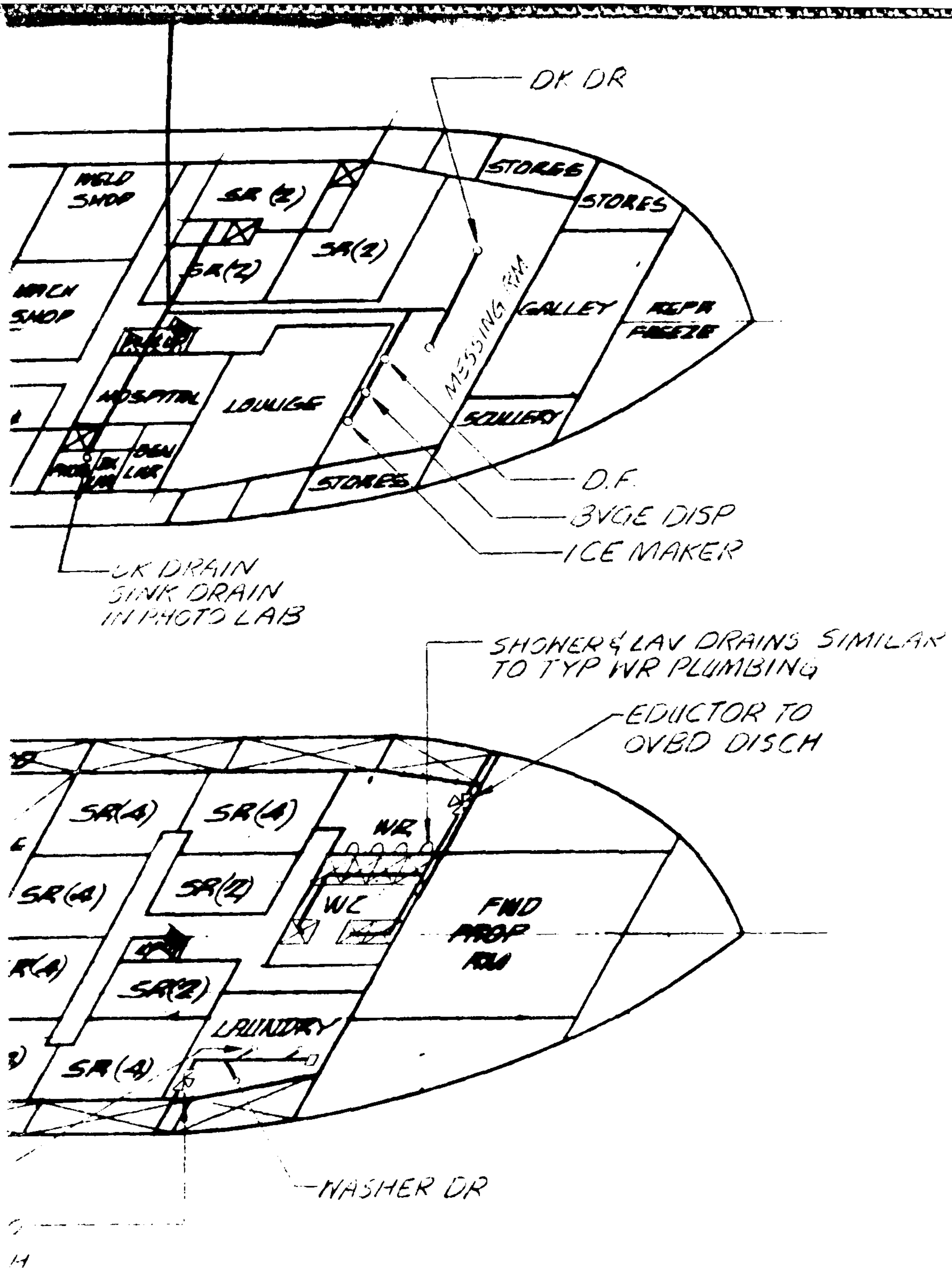
6



...UMBING & DECK DRAIN
...N & BELOW MAIN DECK



...MBING & DRAIN PIPING
... SECOND DECK


DK DR
WELD SHOP
SR (2)
STORES
STORES
SR(2)
SR(2)
MACH SHOP
MESSING RM
GALLEY
REFR FREEZE
HOSPITAL
LOUNGE
SCULLERY
STORES
D.F.
BVGE DISP
ICE MAKER
DK DRAIN
SINK DRAIN
IN PHOTO LAB
SHOWER & LAV DRAINS SIMILAR
TO TYP WR PLUMBING
EDUCTOR TO
OVBD DISCH
SR(4)
SR(4)
WR
SR(4)
SR(2)
WC
FWD
PROP
RM
SR(2)
LAUNDRY
SR(4)
WASHER DR

OF 5 TIMES THE DIA...

13. EDUCTORS ON DIAGRAM ARE S... MOUNTED FOR CLARITY ONLY. ... TO ACHIEVE BETTER PERFORM... MOUNTED VERTICALLY.
14. SYSTEM SHALL BE TESTED UN... TIONS FOR PROPER OPERATIO...
15. PIPING TO BE ROUTED TO SU...
16. BRONZE VALVES W/SCREWED E... ARE GALVANICALLY ISOLATED ... UNIONS (EPCO OR SIMILAR)
17. DRAIN LINES TO BE PITCHED ...

RESERVATION

THIS DRAWING IS FOR ESTIMAT...

NO	DATE	BY	

D...

THIS DRAWING AND THE DESIGN IT ... AND MAY NOT BE REPRODUCED ... THE PRIOR WRITTEN CONSENT ... TO GLOBAL MARINE DEVELOPME...

	NO REQ'D		NEXT ASSEMBLY
			ALTERATION
			DATE
			SHIPYARD
			LOS ANGELES
			TECHNICAL SERVICES
			PURCHASING
			ESTIMATING
			USCG
			ABS

WEST COAS...
YFNB HULL CON...

		DATES
ENGR.		
DFT.	D. NORRIS	4-2-73
CHK.	J.G.	4-22-73
APPR.		
REL.		6/19/73

OF 5 TIMES THE DIAMETER OF THE PIPE.
EDUCTORS ON DIAGRAM ARE SHOWN AS HORIZONTALLY MOUNTED FOR CLARITY ONLY. TO SIMPLIFY PIPING AND TO ACHIEVE BETTER PERFORMANCE, EDUCTORS MAY BE MOUNTED VERTICALLY.
SYSTEM SHALL BE TESTED UNDER NORMAL OPERATING CONDITIONS FOR PROPER OPERATION & UNOBSTRUCTED FLOW.
PIPING TO BE ROUTED TO SUIT CONDITIONS ONBOARD SHIP.
BRONZE VALVES W/SCREWED ENDS MAY BE USED ONLY IF THEY ARE GALVANICALLY ISOLATED FROM STEEL PIPE BY DIELECTRIC UNIONS (EPCO OR SIMILAR) IF NOT, IBBM VALVES MUST BE USED.
DRAIN LINES TO BE PITCHED 1/4" PER FOOT MIN.

SERVATION

IS DRAWING IS FOR ESTIMATING ONLY. NOT FOR CONSTRUCTION.

NO	DATE	BY	DESCRIPTION	APPROVED

ALTERATIONS

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NAVFAC (FPO-1)
WEST COAST OCEAN CONSTRUCTION PLATFORM
YFNB HULL CONVERSION - PLUMBING & DRAIN SYSTEM

LY
N
CES

		DATES
ENGR.		
DFT.	D. NORRIS	4-21-73
CHK.		4-27-73
APPR.		
REL.		

SCALE: NONE

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16" DECIMAL .00 = ± .03
ANGULAR ± 1° .000 = ± .010

JOB AUTH. 20072 510020

DWG. NO. D • 4072 • P004

ALT A

9

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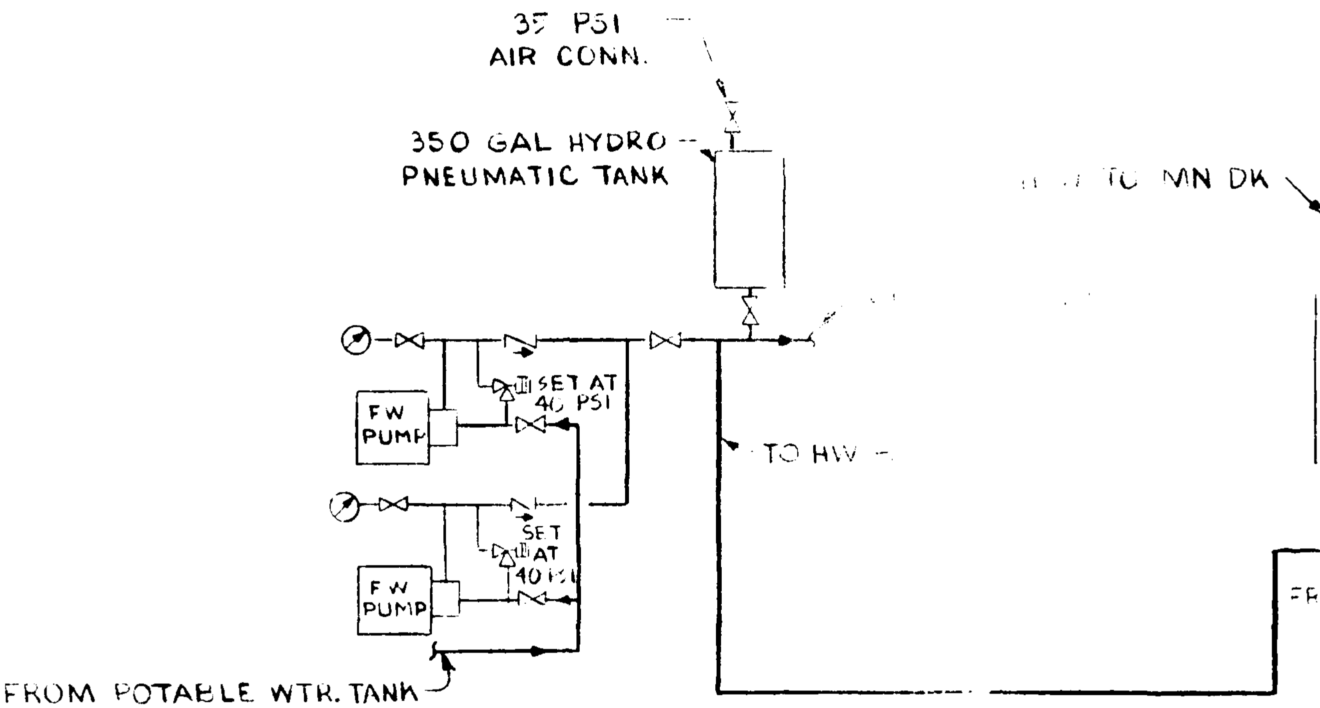
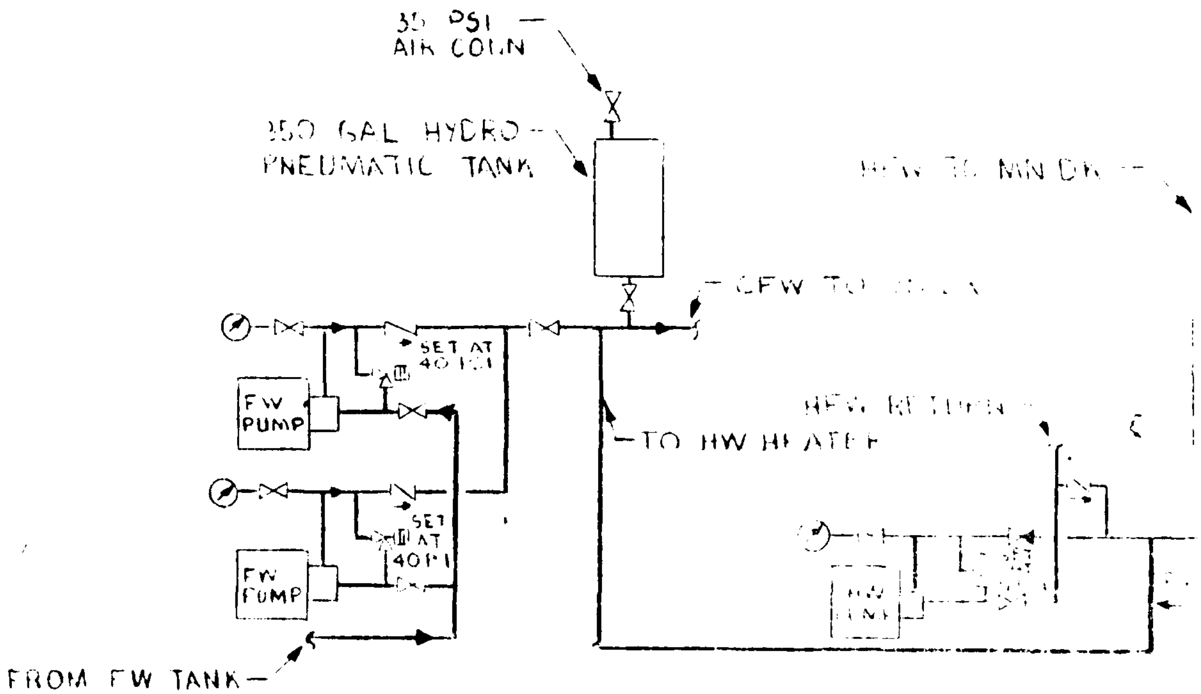


DETAIL "D"
POTABLE WATER



DETAIL "C"
FRESH & WASH WATER

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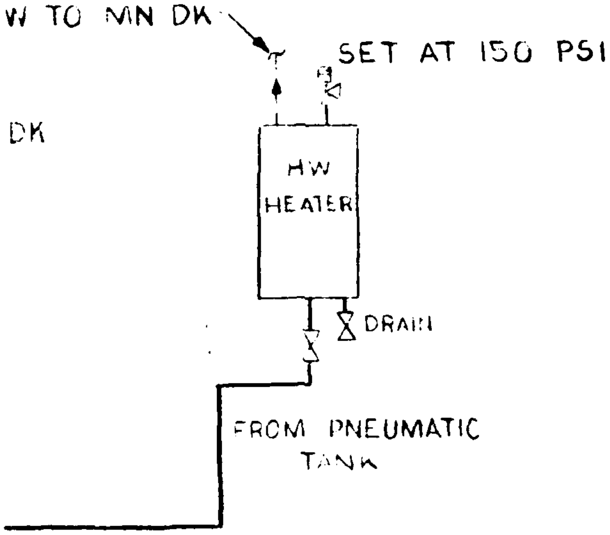
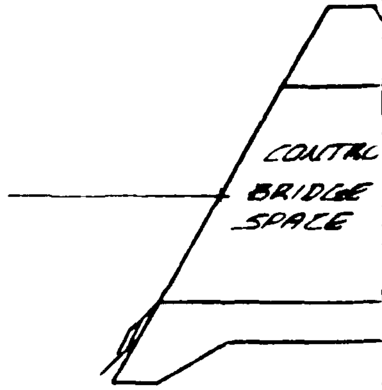
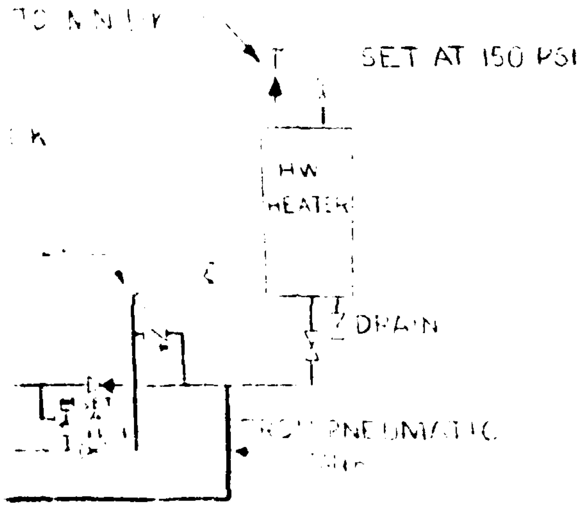
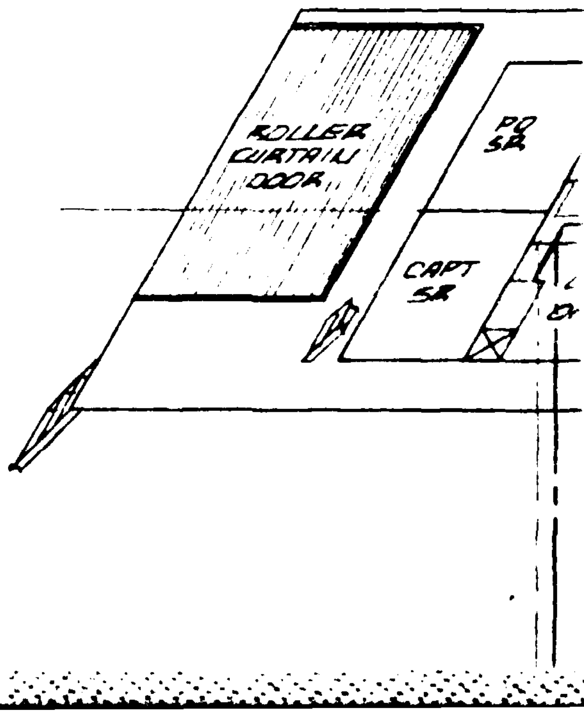
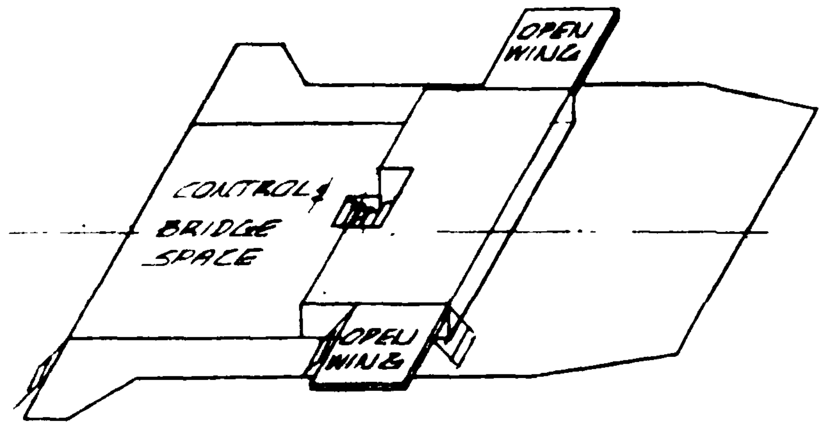

W TO MN DK
SET AT 150 PSI
DK
HW HEATER
DRAIN
FROM PNEUMATIC TANK

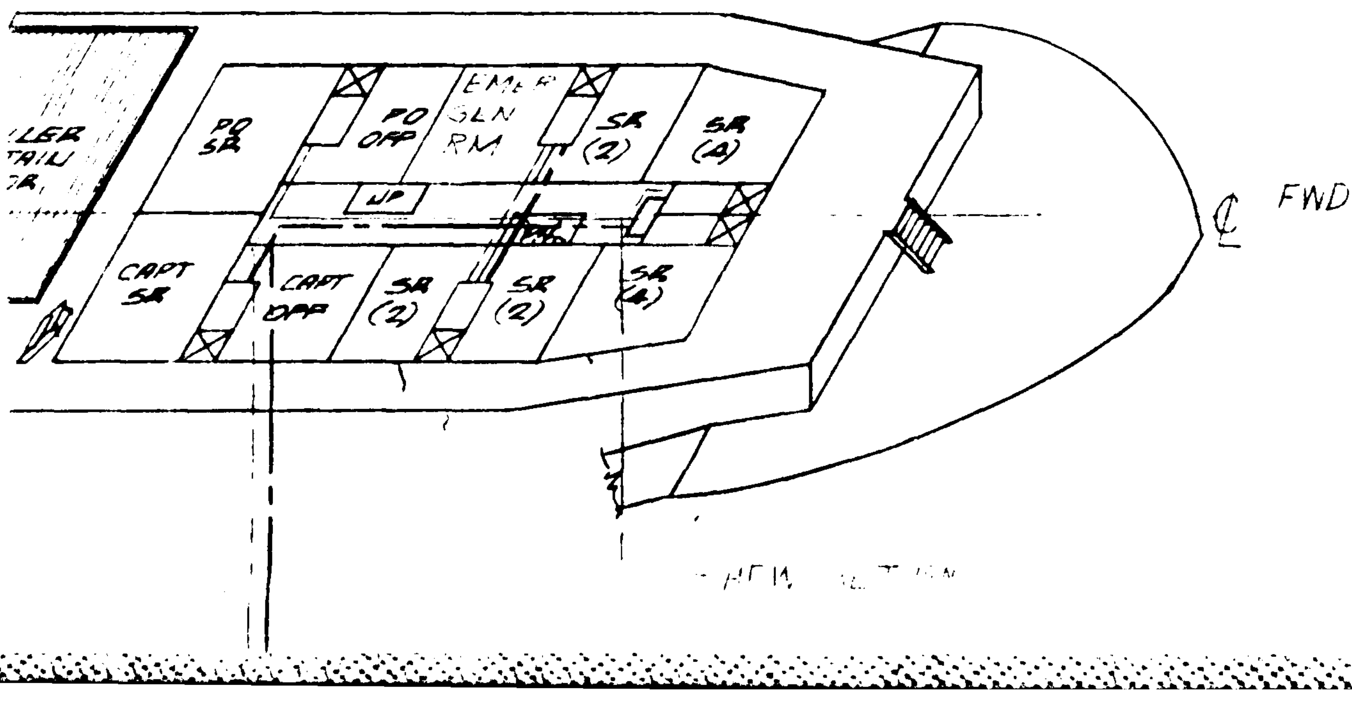

BRIDGE
SPACE


SET AT 150 PSI
HW HEATER

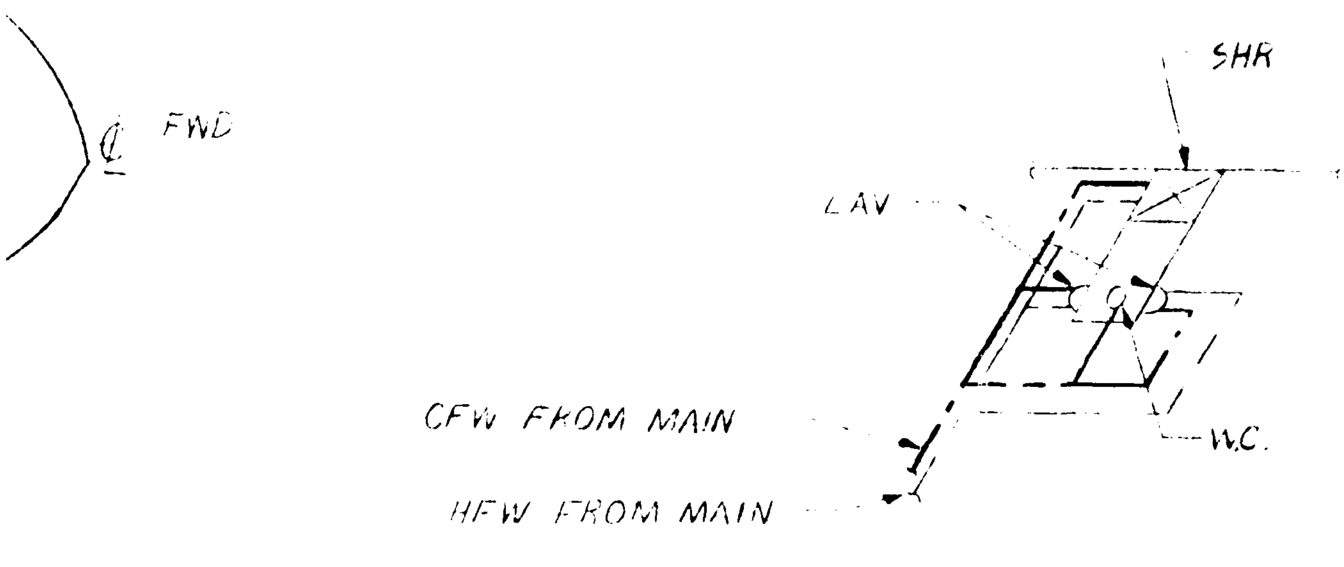

ROLLER
CURTAIN
DOOR
CAPT
SR

R


OPEN WING
CONTROL & BRIDGE SPACE
OPEN WING


PO SR
PO OFF
EMER GEN RM
SR (2)
SR (4)
CAPT SR
CAPT OFF
SR (2)
SR (2)
SR (4)
FWD

4



(3)

LIST OF MATERIALS

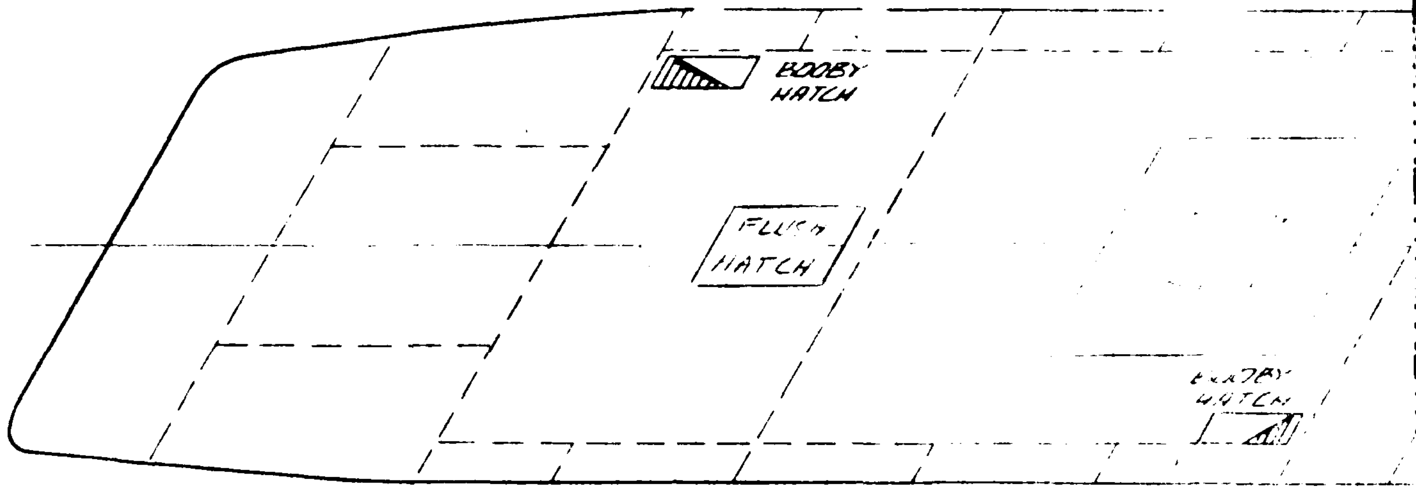
ITEM	QTY	DESCRIPTION	MATERIAL

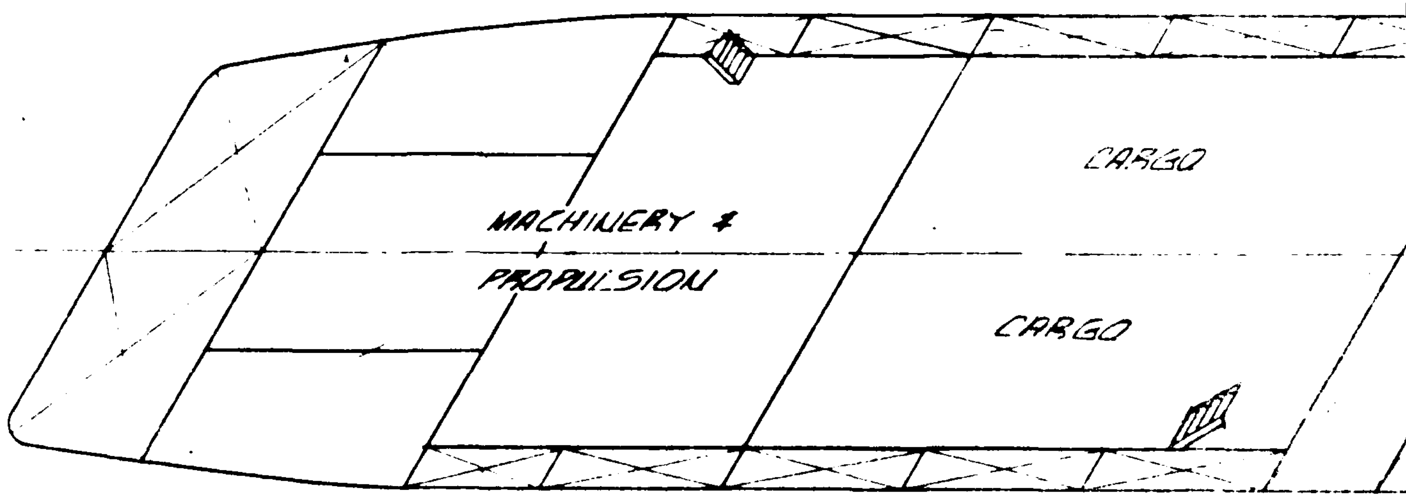
SHA

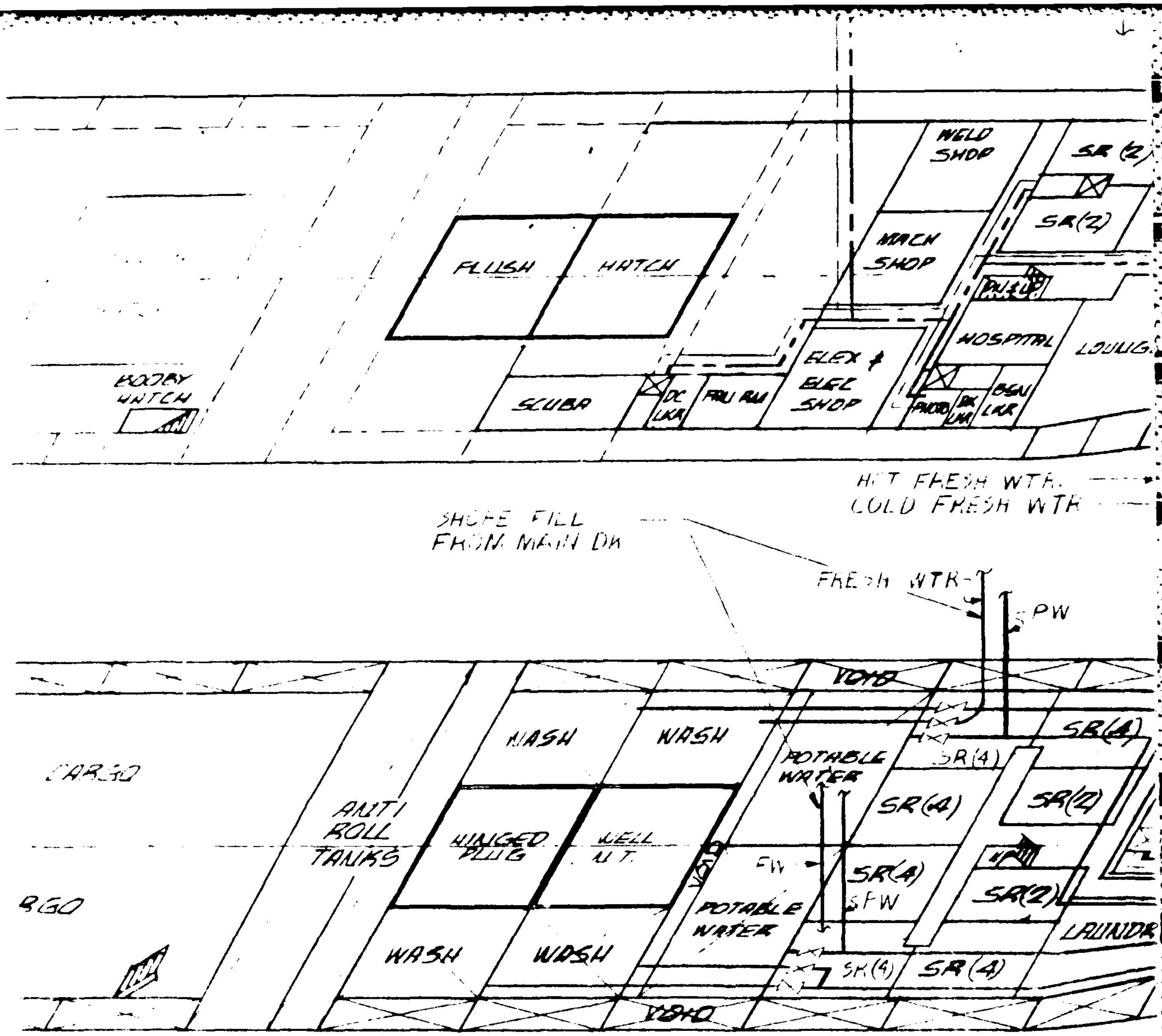
W.C

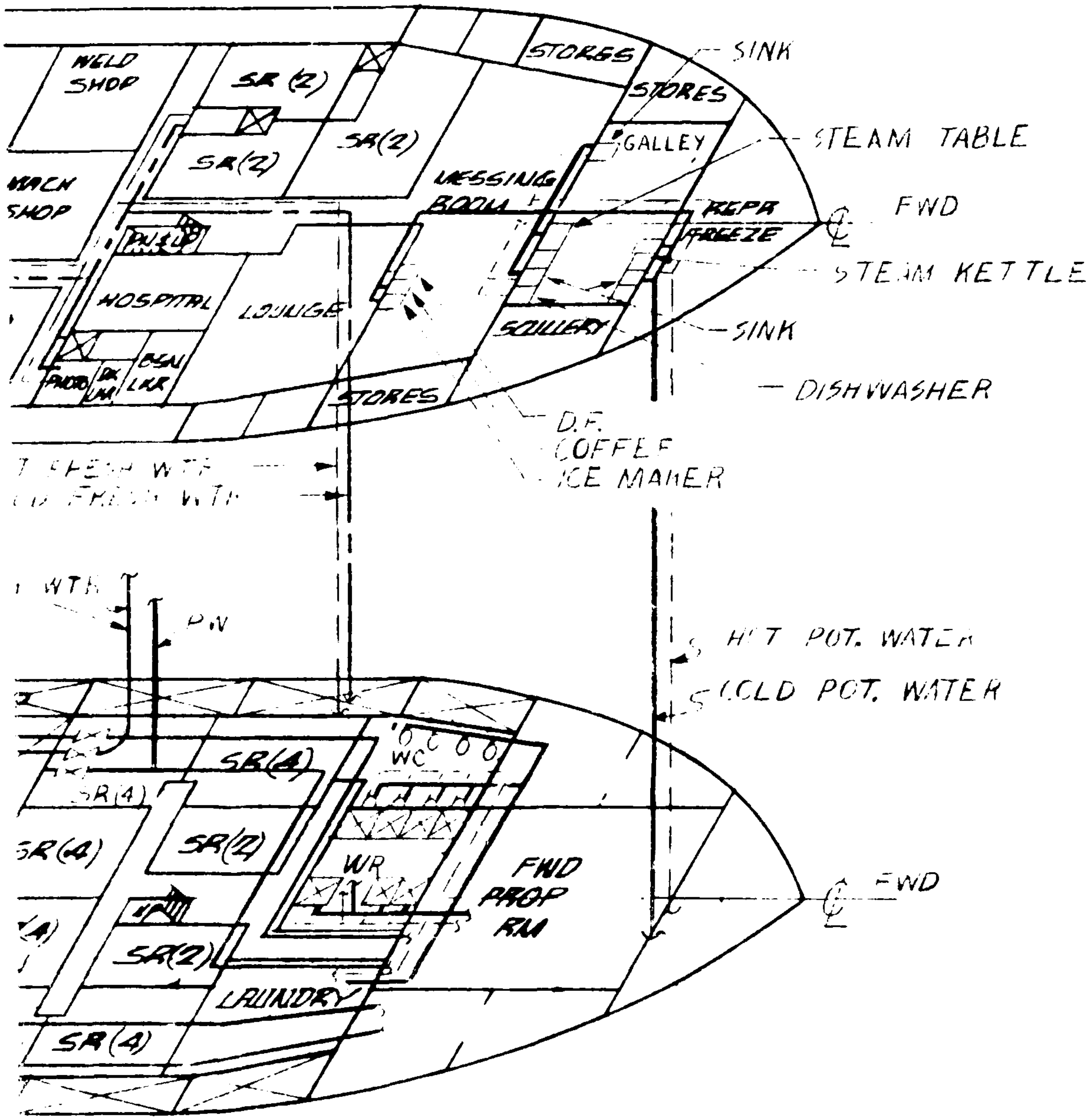
GENERAL NOTES:

1. ALL PIPE TO BE SCH.40 GALV. UNLESS NOTED
2. SPOOLS OR DOUBLER PLATES TO BE USED AT ALL W.T. BHDS & DECKS.


BOOBY HATCH
FLUSH HATCH
BOOBY HATCH


MACHINERY &
PROPULSION
CARGO
CARGO


WELD SHOP
SR(2)
SR(2)
MACH SHOP
FLUSH HATCH
HOSPITAL
ELEX & ELEC SHOP
SCUBA
DC LKR
PHOTO
DK LKR
BSN LKR
BOOBY HATCH
HOT FRESH WTR
COLD FRESH WTR
SHORE FILL FROM MAIN DK
FRESH WTR
PW
VOID
WASH
WASH
POTABLE WATER
SR(4)
SR(4)
SR(4)
SR(2)
CARGO
ANTI ROLL TANKS
WINGED PLUG
FW
SFW
SR(4)
SR(2)
POTABLE WATER
WASH
WASH
SR(4)
SR(4)
VOID


WELD SHOP
SR(2)
STORES
SINK
STORES
SR(2)
SR(2)
GALLEY
STEAM TABLE
SHOP
FWD
FREEZE
STEAM KETTLE
HOSPITAL
LOUNGE
SINK
DISHWASHER
STORES
D.F.
COFFEE
ICE MAKER
COLD POT. WATER
SR(4)
WC
SR(4)
SR(2)
WR
FWD
PROP
RM
FWD
SR(2)
LAUNDRY
SR(4)

DETAIL 7
TYPICAL HEAD (FRESH WATER)

RESERVATION

THIS DRAWING IS F

TLE

SYMBOL LIST

GLOBE VALVE
STOP CHECK VALVE
SWING CHECK VALVE
RELIEF VALVE
GAGE
CPW
HPW
HFW
CFW

NO	DATE	BY

THIS DRAWING AND THE
AND MAY NOT BE REPRO
THE PRIOR WRITTEN C
TO GLOBAL MARINE

WEST C
YFNB HULL CONV

NO REQ'D	NEXT ASSEMBLY
	ALTERATION
	DATE
	SHIPYARD
	LOS ANGELES
	TECHNICAL SERVICES
	PURCHASING
	ESTIMATING
	USCG
	ABS

		DAT
ENGR.		
DFT.		
CHK.	JG	
APPR.		
REL.		

WATER

RESERVATION

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NO	DATE	BY	DESCRIPTION	APPROVED

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Los Angeles, Calif.

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NAVFAC (FPO-1)

WEST COAST OCEAN CONSTRUCTION PLATFORM

[illegible] CONVENIENT WASH WATER AND POTABLE WATER [illegible]

NEXT ASSEMBLY

	DATES
ENGR.	
DFT.	
CHK.	
APPR.	
REL.	

SCALE:

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16" DECIMAL .00 = ± .03
ANGULAR ± ½° .000 = ± .010

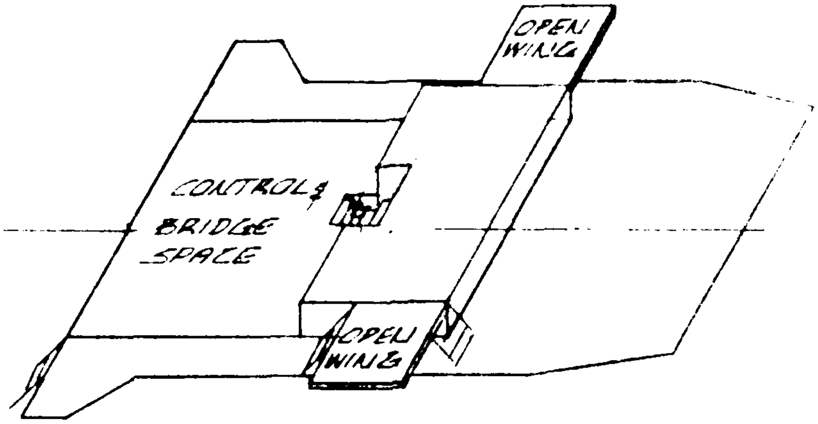
JOB AUTH.

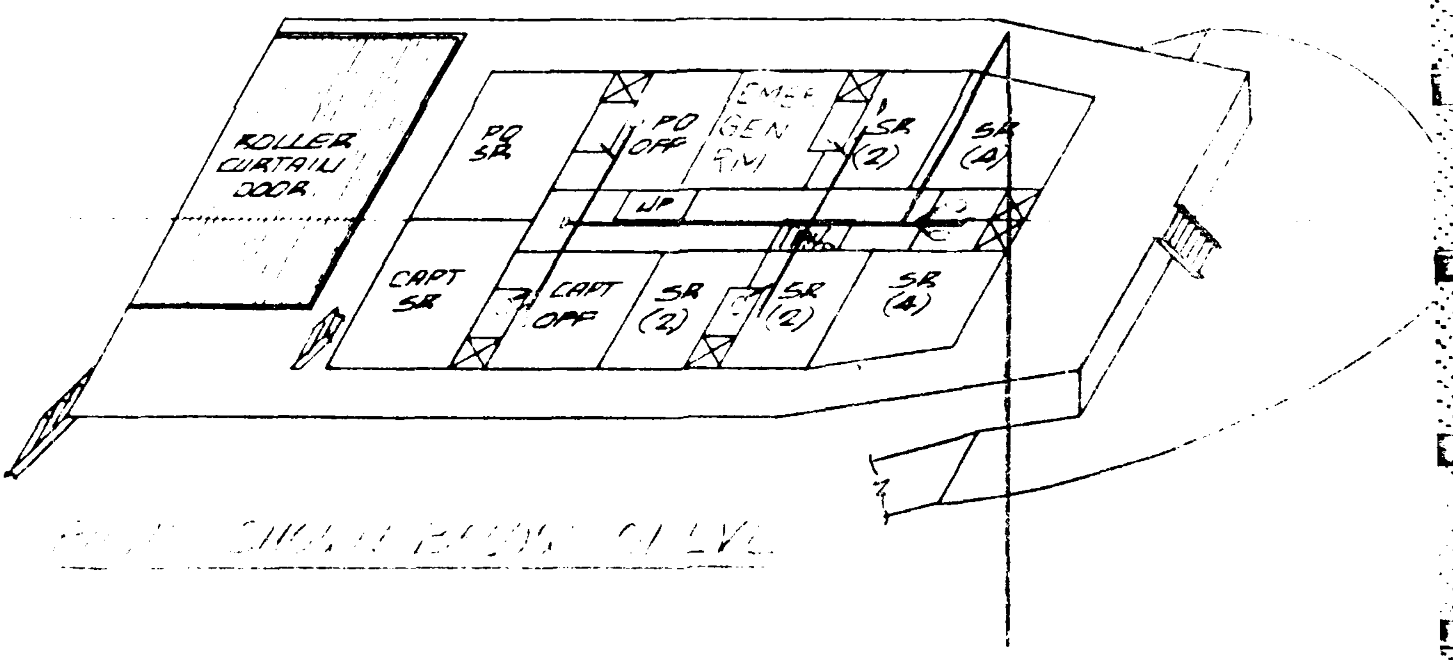
DWG. NO. D • 40[illegible] • PC05

ALT A

(10)

1





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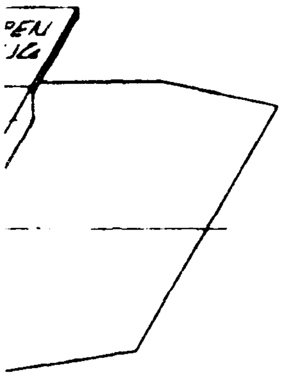
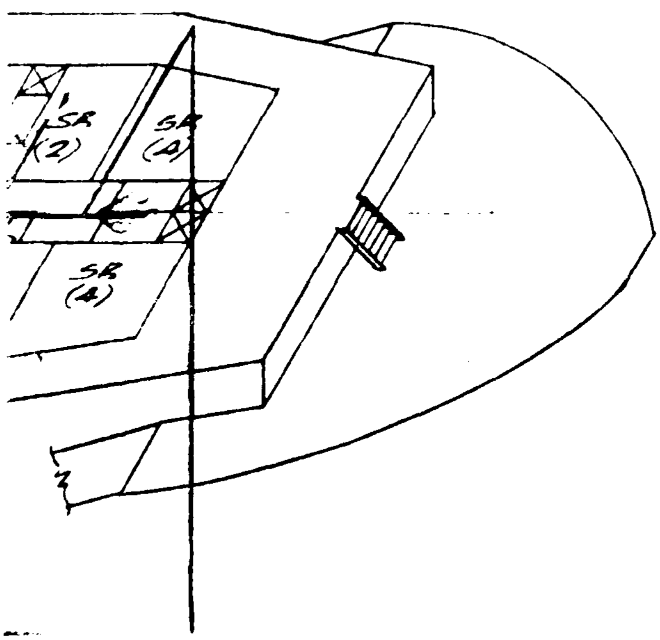
2



CLEAN OUT (TYP AT EA W.C.)



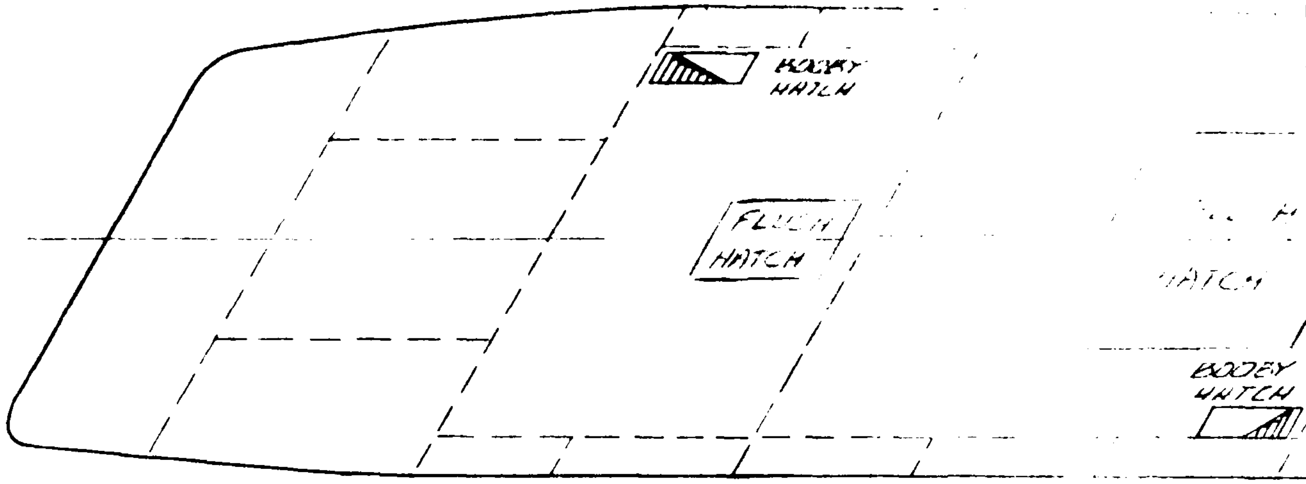
3

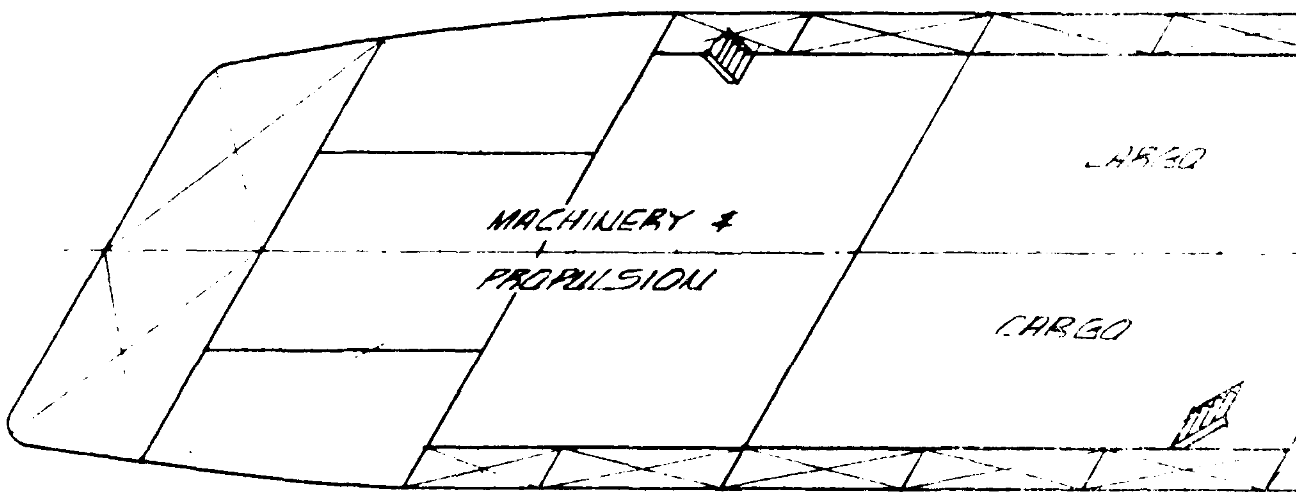
LIST OF MATERIALS

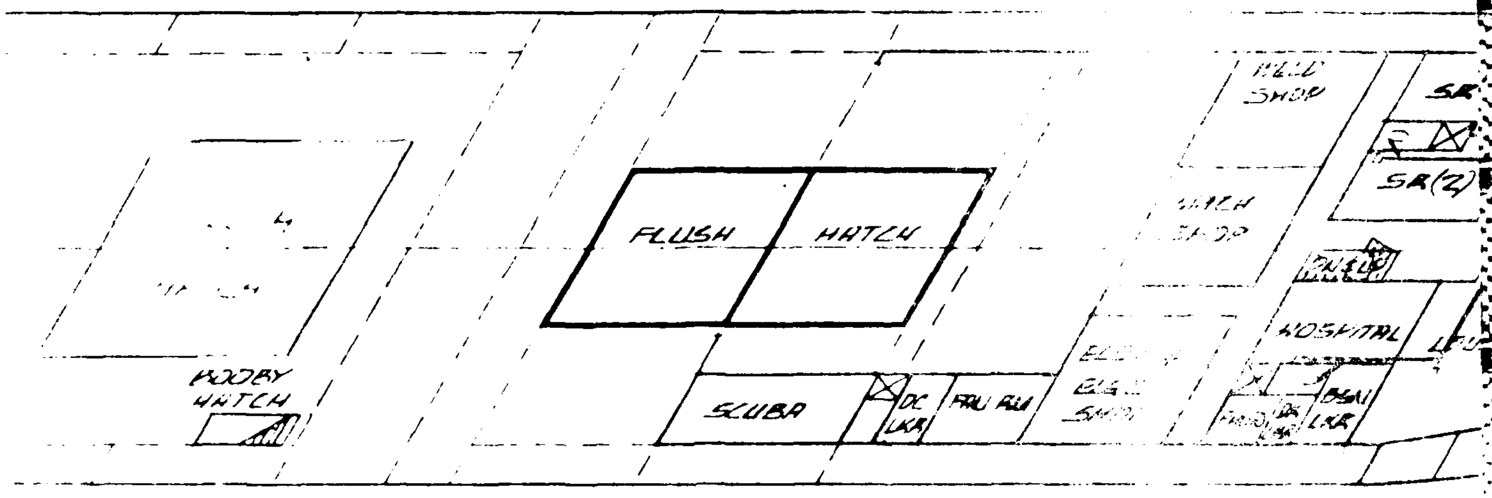
ITEM	QTY	DESCRIPTION	MATERIAL

GENERAL NOTES:

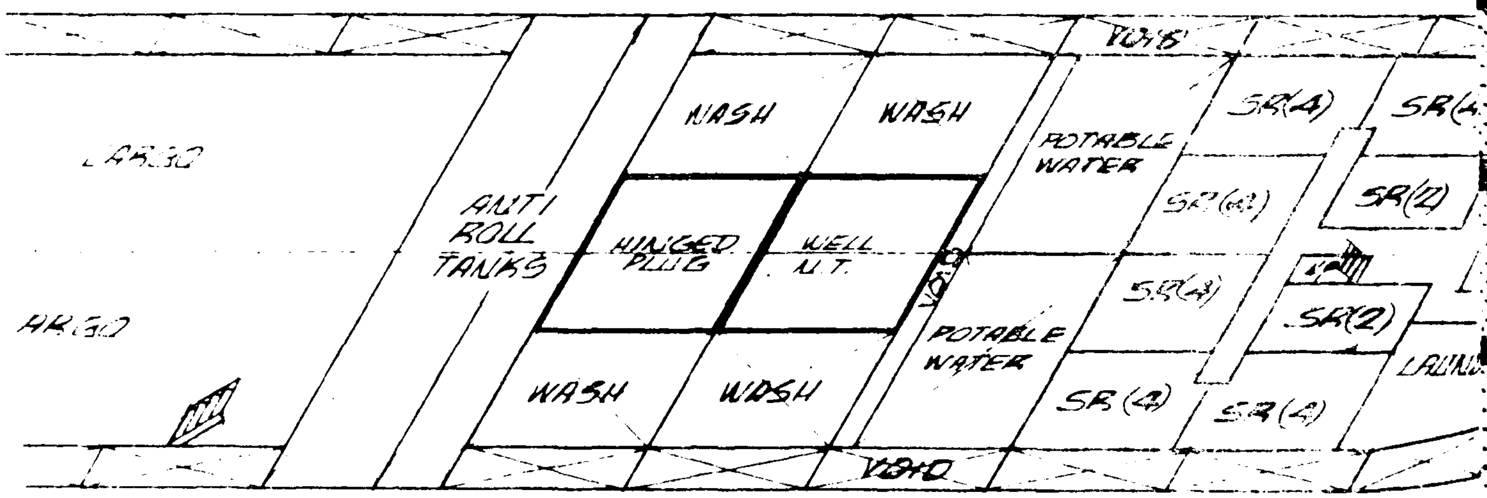
1. ALL PIPE TO BE SCH.40 GALVANIZED UNLESS NOTED.
2. DOUBLER PLATES TO BE USED AT ALL W.T. DECK & BHD PENETRATIONS FOR 2-1/2" PIPE & ABOVE.
3. SCH.80 PIPE NIPPLES & DOUBLER PLATES TO BE USED AT W.T. DECK & BHD PENETRATIONS FOR PIPE 2" & BELOW.
4. DRAINS TO BE PITCHED 1/4" PER FT. MIN.


BOOBY HATCH
FLUSH HATCH
HATCH
BOOBY HATCH

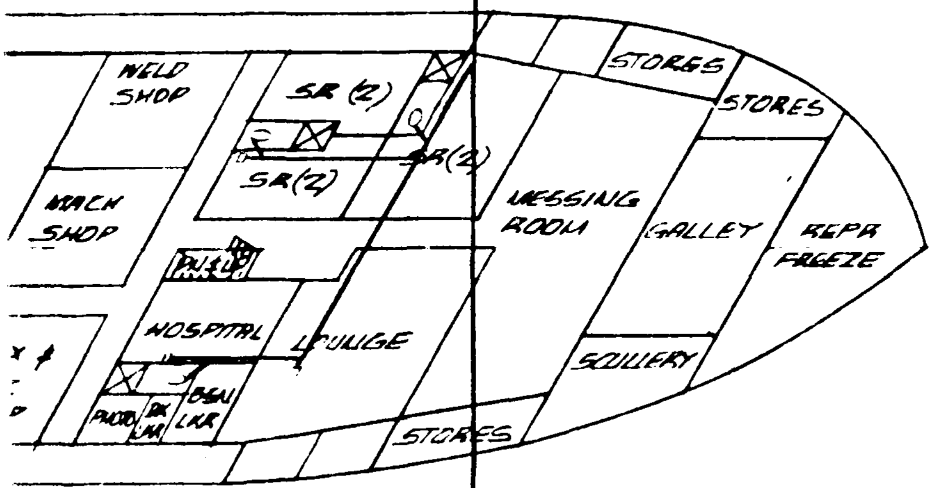

MACHINERY &
PROPULSION
CARGO
CARGO



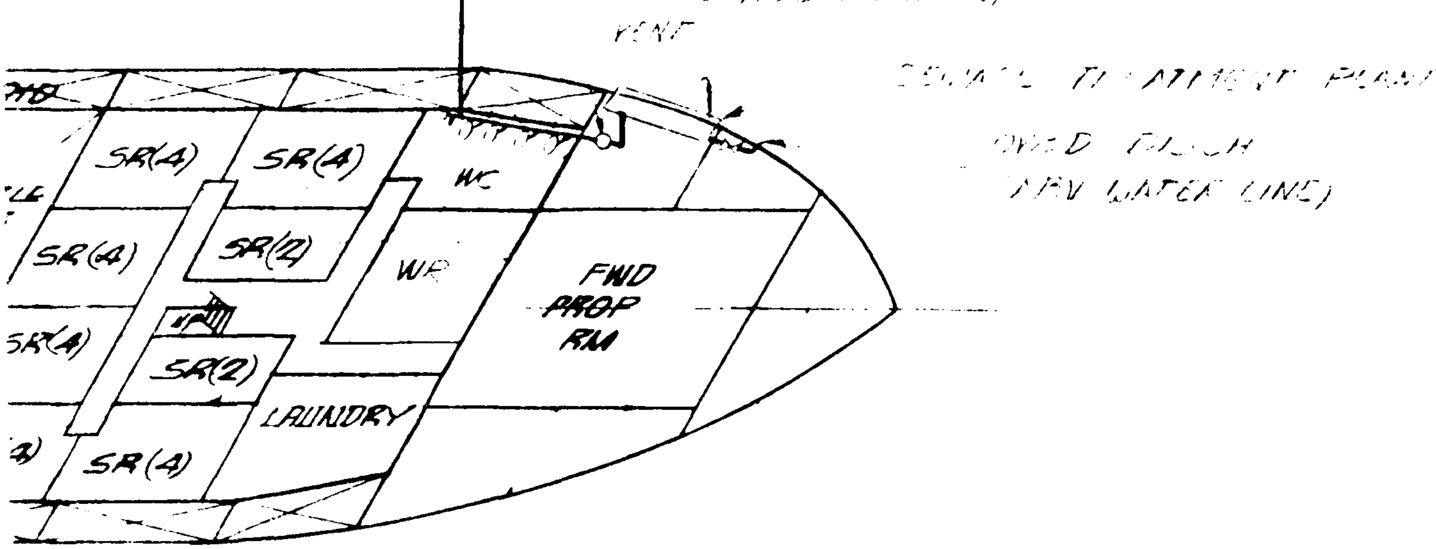
PIPING SHOWN



PIPING SHOWN AT 2ND DK



MAIN DK



MID DK

RESERVATION

THIS DRAWING IS FO

TREATMENT PLANT

DI... H

(WATER LINES)

NO	DATE	BY

THIS DRAWING AND
AND MAY NOT BE
THE PRIOR WRIT
TO GLOBAL MAR

NO REQ'D	NEXT ASSEMBLY
	ALTERATION
	DATE
	SHIPYARD
	LOS ANGELES
	TECHNICAL SERVICES
	PURCHASING
	ESTIMATING
	USCG
	ABS

WES

YF

ENGR.	
DFT.	
CHK.	PF
APPR.	
REL.	

RESERVATION

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NO	DATE	BY	DESCRIPTION	APPROVED

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NAVFAC (FPO-1)

WEST COAST OCEAN CONSTRUCTION PLATFORM

YFNB HULL CONVERSION - SEWAGE SYSTEM

ASSEMBLY
RATION
LES
SERVICES
NG
G

		DATES
ENGR.		
DFT.	JG	20APR78
CHK.	PF	20APR
APPR.		
REL.		6/10/78

SCALE:

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16"
DECIMAL .00 = ± .03
ANGULAR ± ½° .000 = ± .010

JOB AUTH.	DWG. NO.	ALT
04072 / 19000	D•9072•P006	A

8

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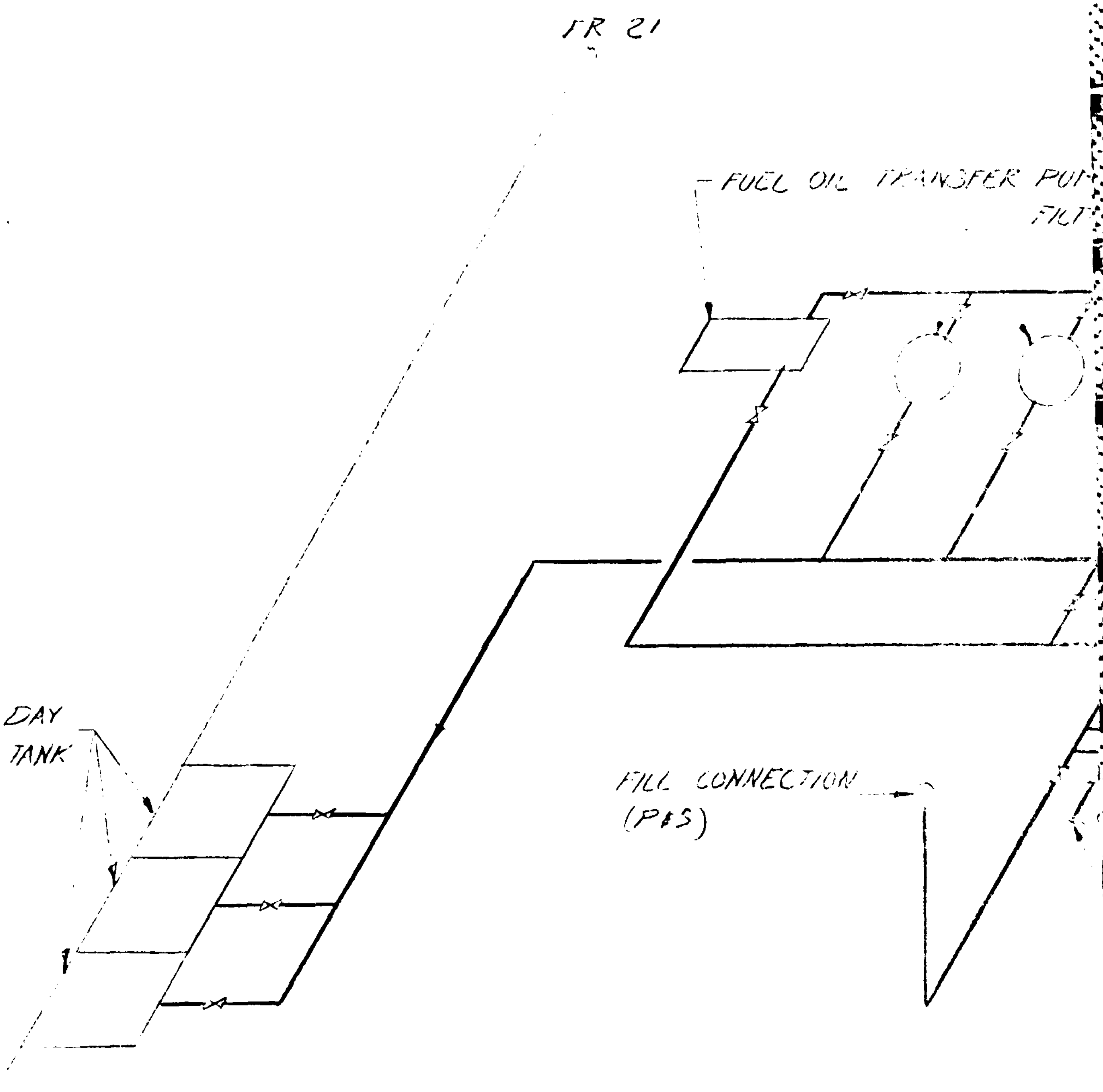
1



DETAIL A

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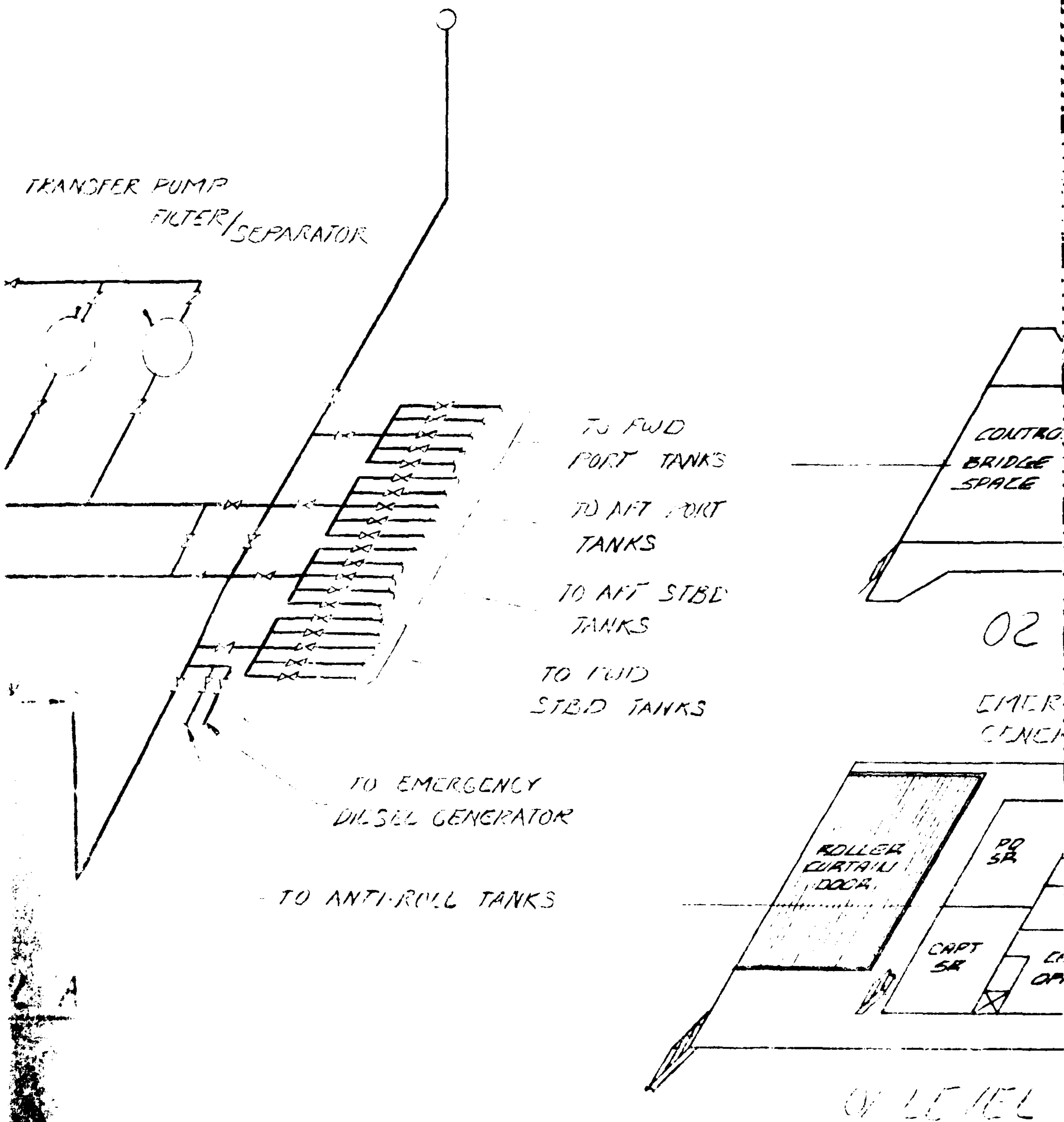
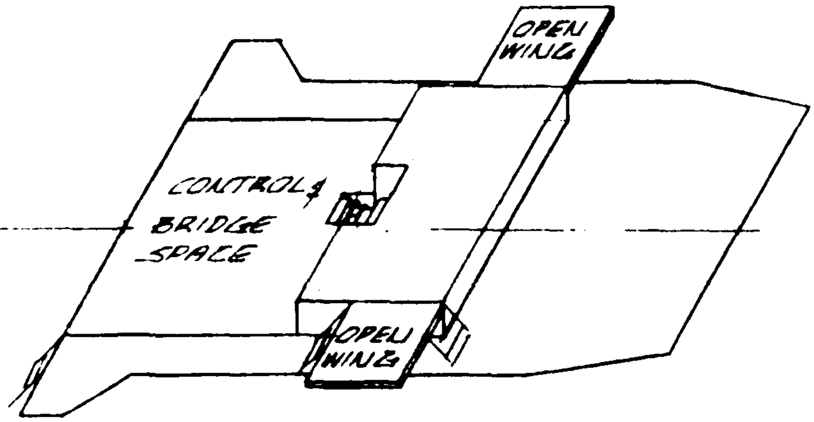
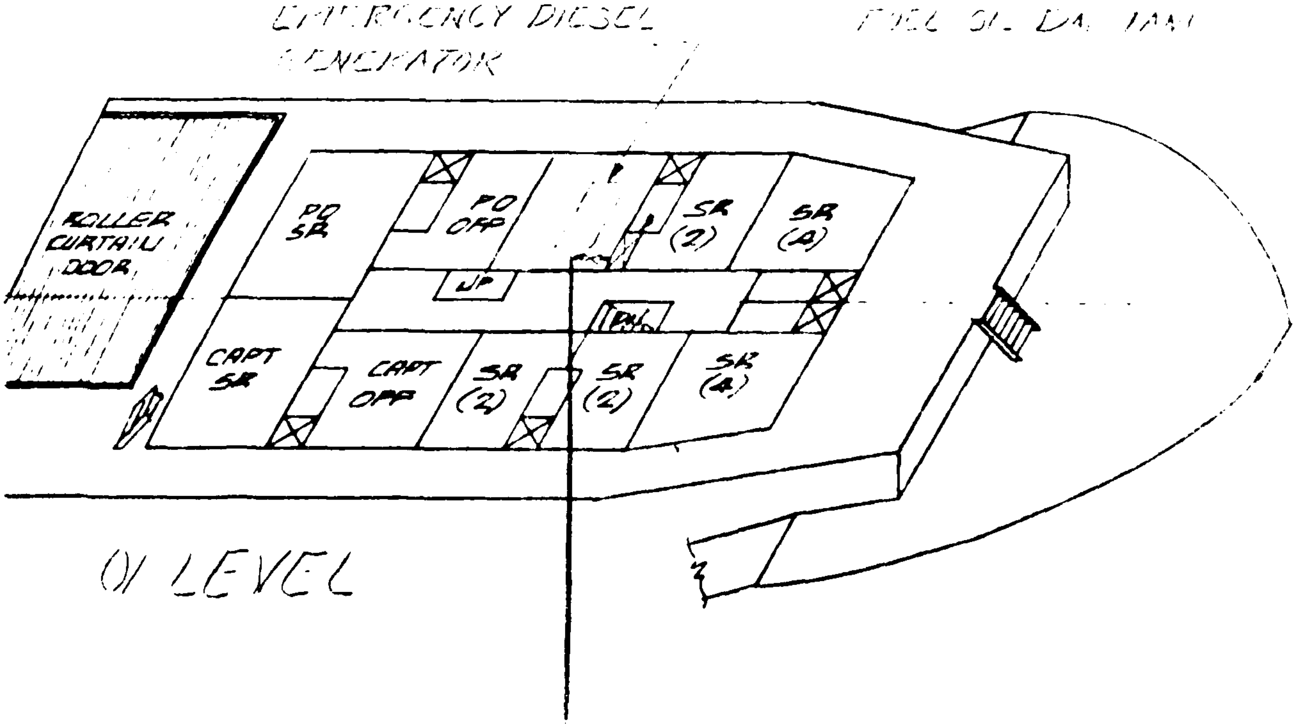

TRANSFER PUMP
FILTER/SEPARATOR
TO FWD PORT TANKS
TO AFT PORT TANKS
TO AFT STBD TANKS
TO FWD STBD TANKS
TO EMERGENCY DIESEL GENERATOR
TO ANTI-ROLL TANKS
BRIDGE SPACE
02
ROLLER CURTAIN DOOR
PO SR
CAPT SR
01 LEVEL

3



02 LEVEL



01 LEVEL

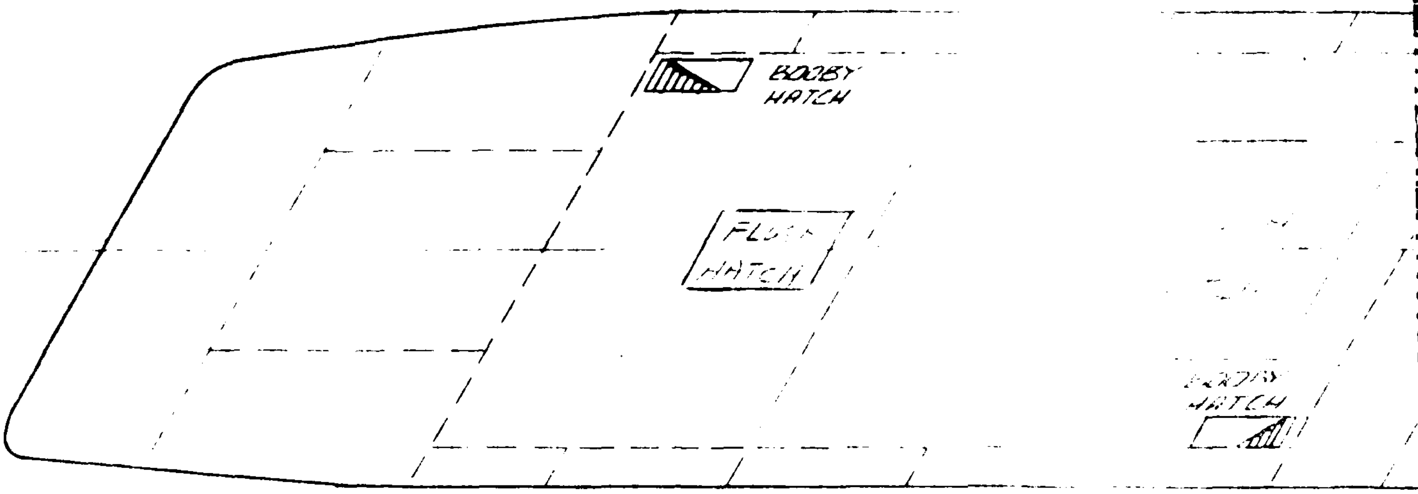
(4)

LIST OF MATERIALS

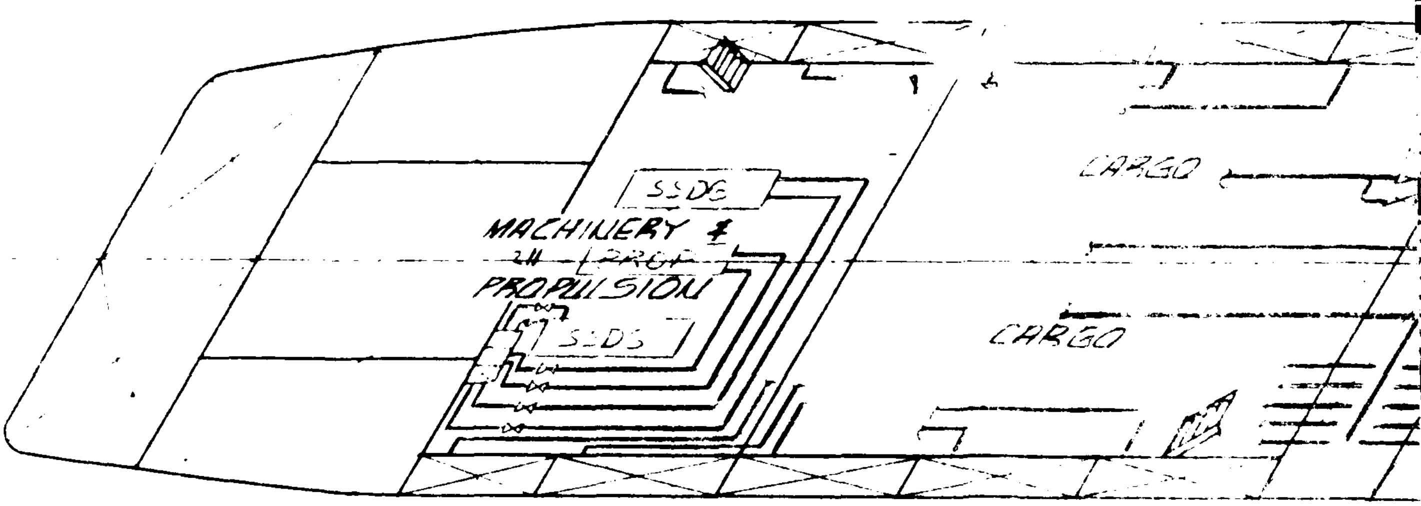
ITEM	QTY	DESCRIPTION	MATERIAL

GENERAL NOTES:

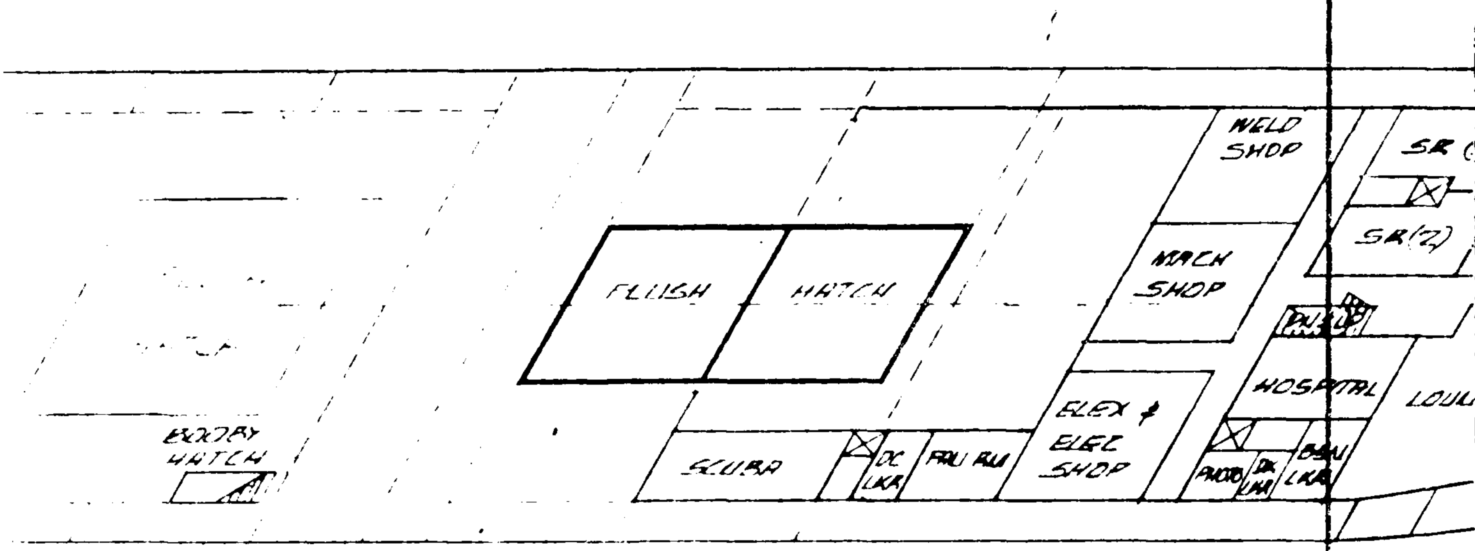
1. ALL FLANGED FITTINGS IN THE FUEL OIL SYST[illegible] WITH SAFETY SHIELDS TO PREVENT IMPINGEMENT [illegible] OIL UNDER PRESSURE ON HOT SURFACES.
2. CONTAINMENT SHIELDS WITH A MINIMUM HEIGHT [illegible] PROVIDED AT EACH FILL CONNECTION ON [illegible] HOLDING APPROXIMATELY [illegible] BARRELS AND [illegible]
3. DRAINS SHALL BE PROVIDED [illegible] THE TRANSFER [illegible] LOW POINTS IN THE PIPING RUNS.


BOOBY
HATCH
HATCH
HATCH

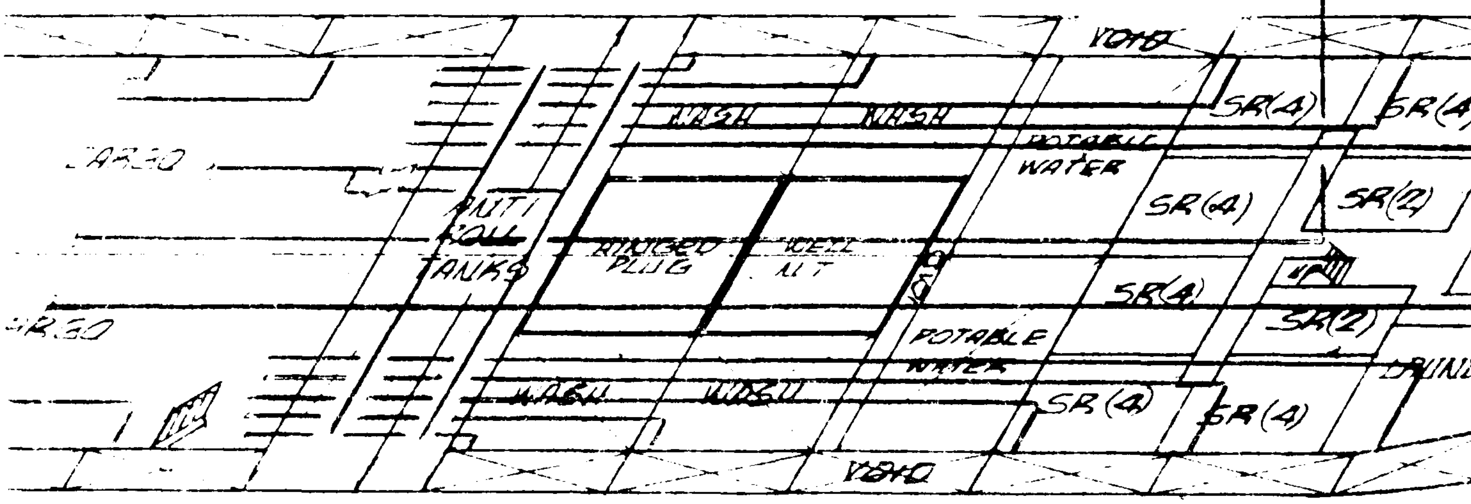
MAIN


SSDS
MACHINERY &
PROPULSION
SSDS
CARGO
CARGO

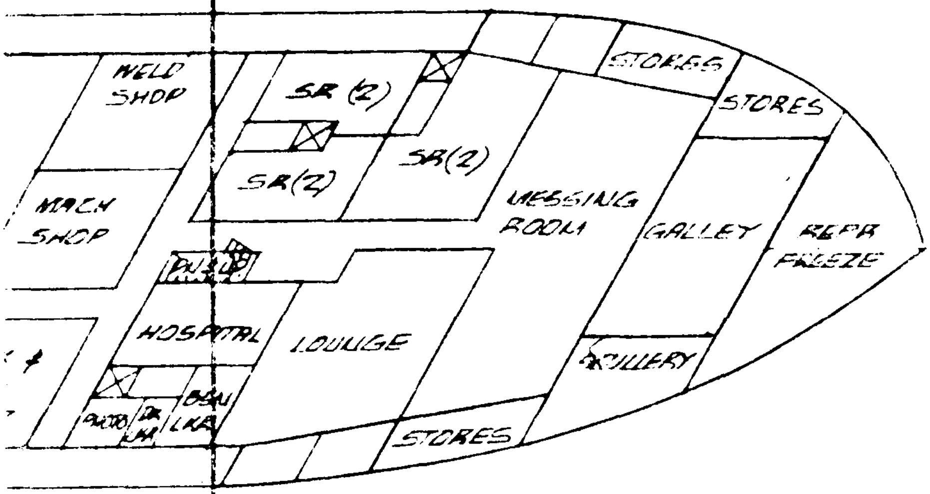
2ND

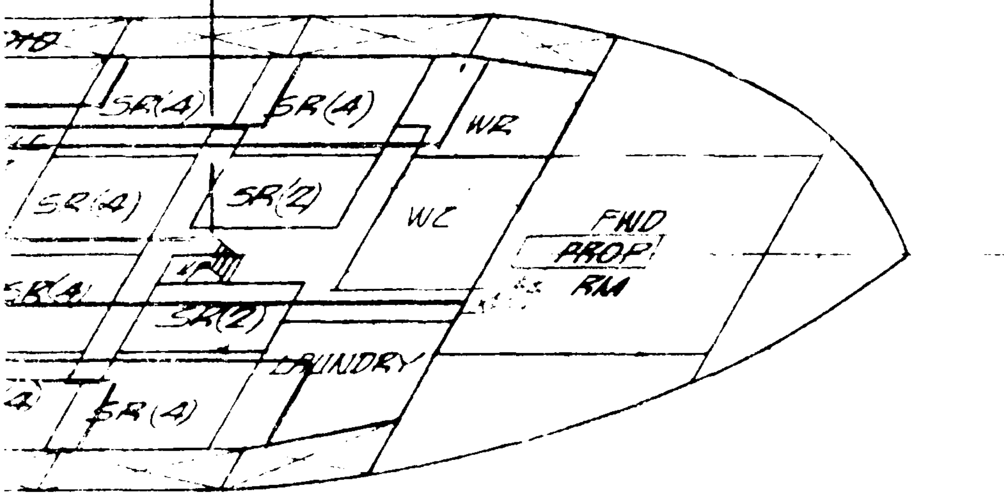


MAIN DECK



2ND DECK


WELD SHOP
SR (2)
STORES
STORES
SR(2)
SR(2)
MACH SHOP
MESSING ROOM
GALLEY
REFR FREEZE
HOSPITAL
LOUNGE
SCULLERY
PHOTO
STORES


SR(4)
SR(4)
WR
SR(4)
SR(2)
WC
FWD PROP RM
SR(2)
LAUNDRY
SR(4)

RESERVATION

THIS DRAWING IS FOR ESTIMATI

NO	DATE	BY	

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AND MAY NOT BE REPRODUC
THE PRIOR WRITTEN CONSE
TO GLOBAL MARINE DEVELO

	NO REQ'D		NEXT ASSEMBLY
			ALTERATION
			DATE
			SHIPYARD
			LOS ANGELES
			TECHNICAL SERVICES
			PURCHASING
			ESTIMATING
			USCG
			ABS

WEST COAST OCEAN C
FU

	DATES
ENGR.	
DFT.	
CHK.	4 May
APPR.	
REL.	

RESERVATION

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NO	DATE	BY	DESCRIPTION	APPROVED

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Los Angeles, Calif.

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EMBLY
TION

S
SERVICES

NAVFAC (FPO-1)
WEST COAST OCEAN CONSTRUCTION PLATFORM YFNB HULL CONVERSION
FUEL OIL & TRANSFER SYSTEM

	DATES
ENGR.	
DFT.	
CHK.	4 May 78
APPR.	
REL.	

SCALE:

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16" DECIMAL .00 = ± .03
ANGULAR ± 1/2° .000 = ± .010

JOB AUTH.

DWG. NO. D • 4072 • P007

ALT A

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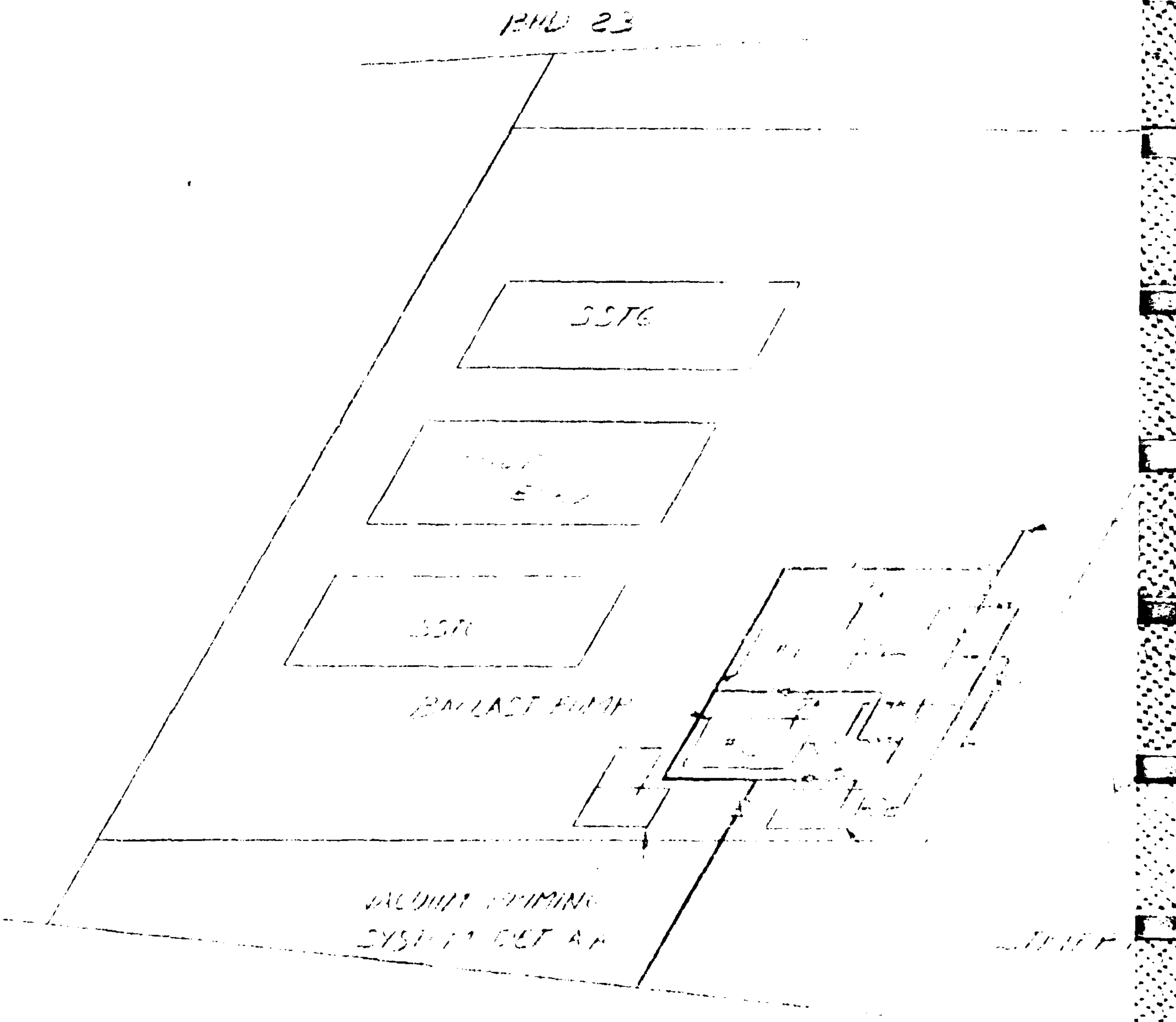
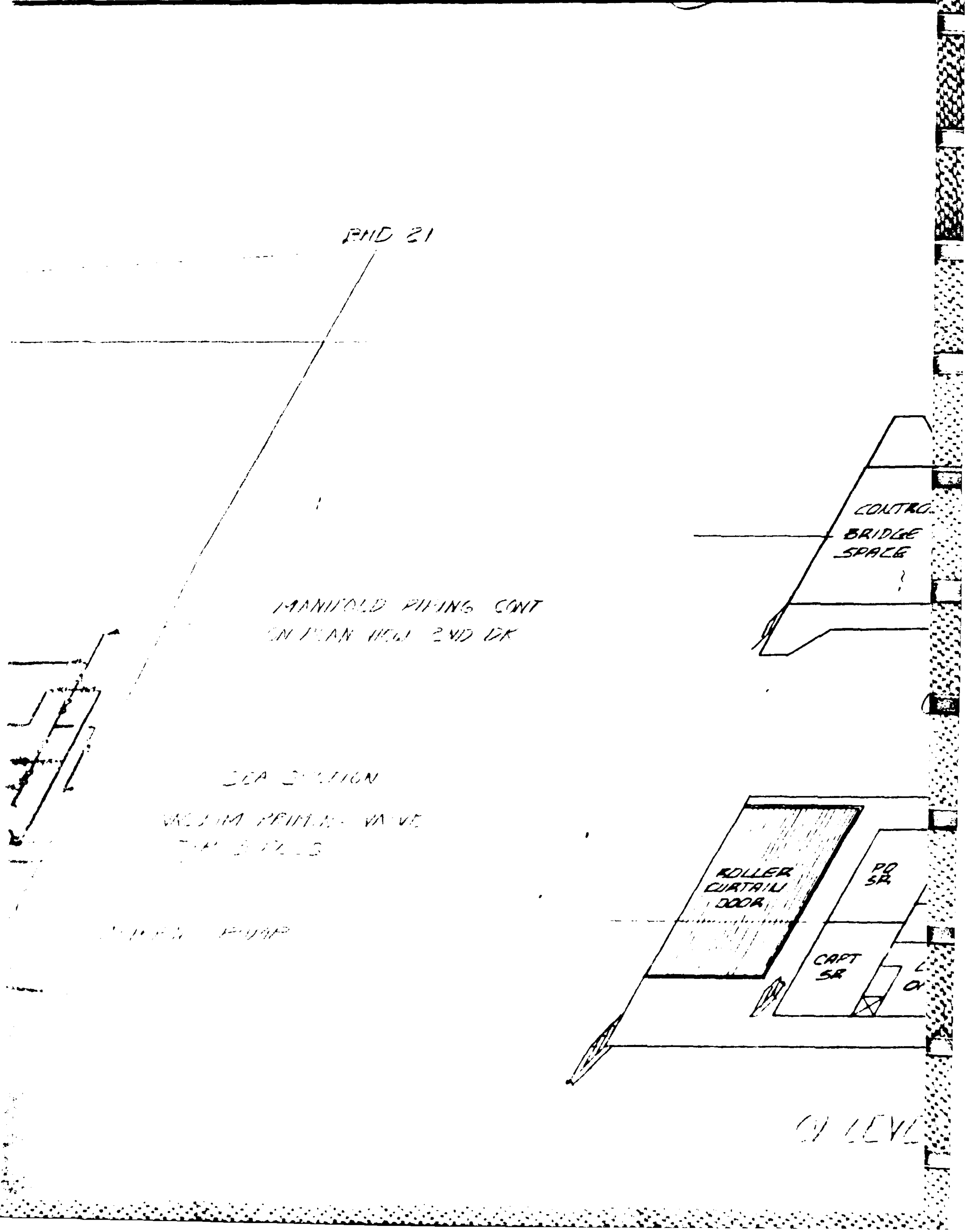


DETAIL B-B

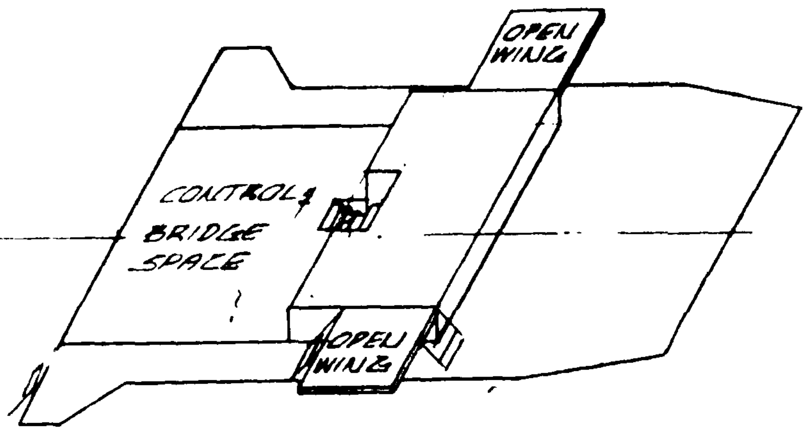
Reproduced from best available copy.

(2)

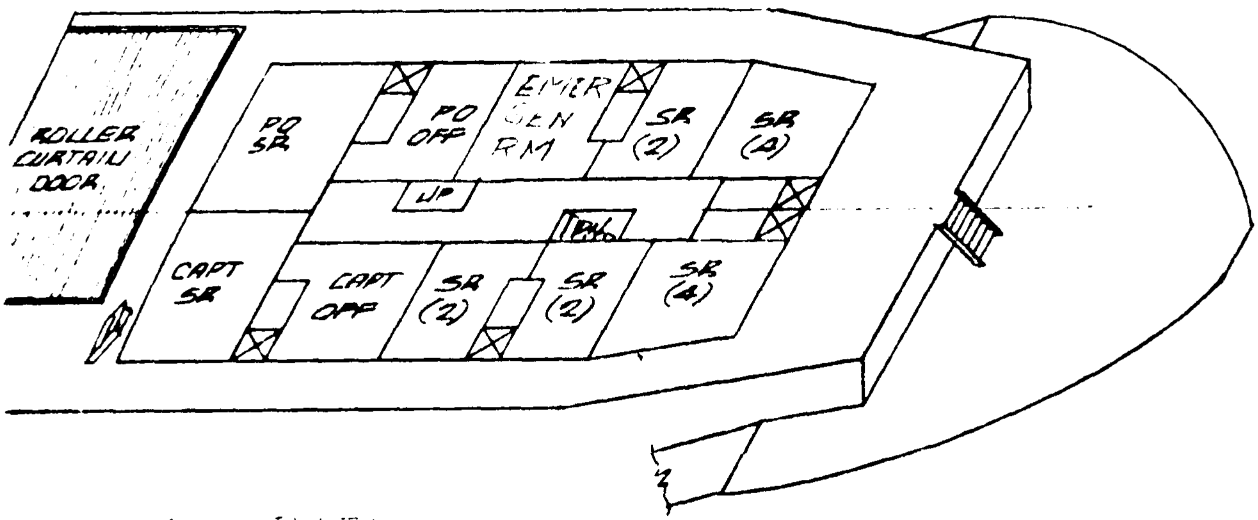

BHD 21
MANIFOLD PIPING CONT
ON PLAN VIEW 2ND DK
CONTRO
BRIDGE
SPACE
ROLLER
CURTAIN
DOOR
PO
SR
CAPT
SR

TO BALLAS

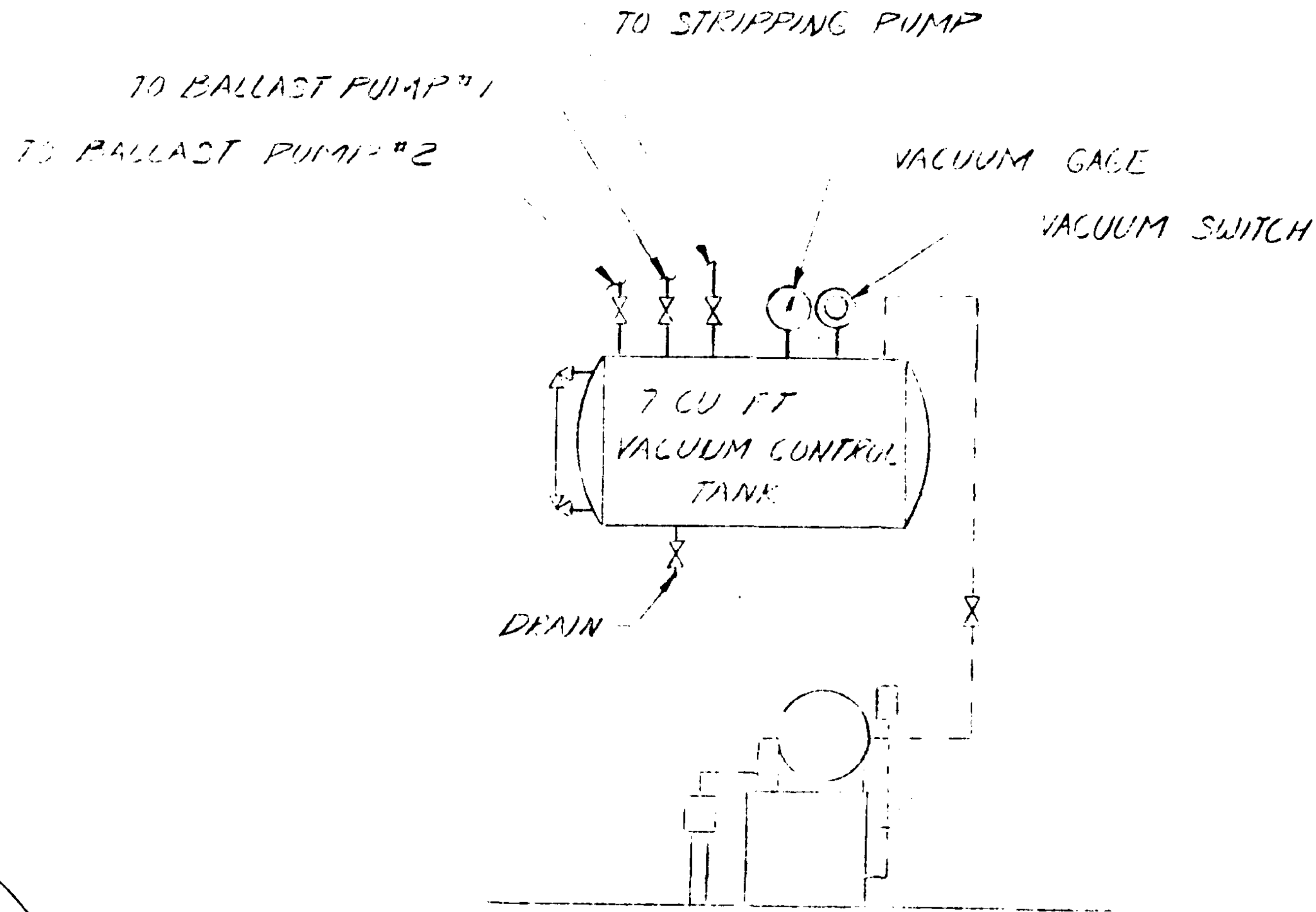
TO BALLAST P



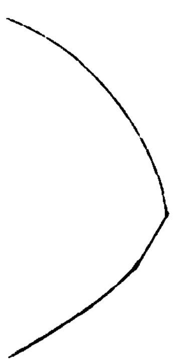
02 LEVEL



01 LEVEL

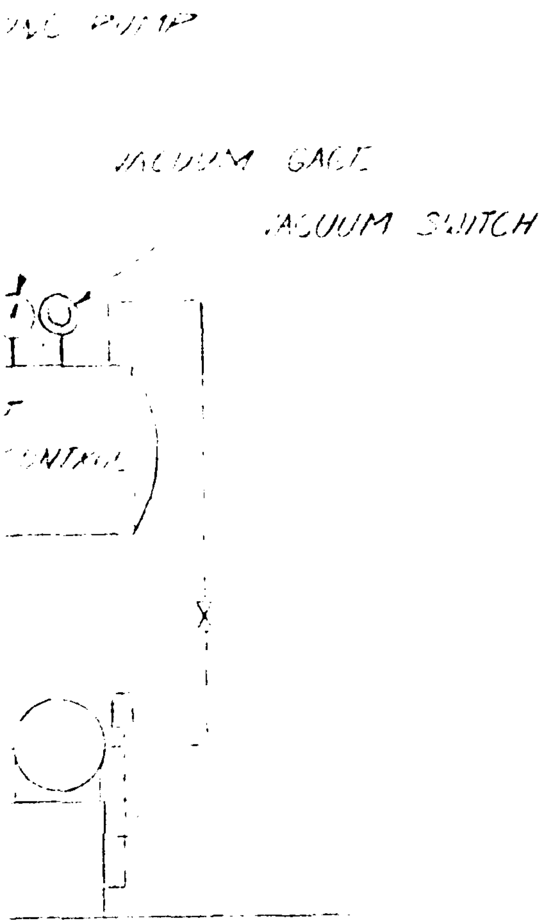

TO STRIPPING PUMP
TO BALLAST PUMP #1
TO BALLAST PUMP #2
VACUUM GAGE
VACUUM SWITCH
7 CU FT
VACUUM CONTROL
TANK
DRAIN

DETAIL A-A



LIST OF MATERIALS

ITEM	QTY	DESCRIPTION

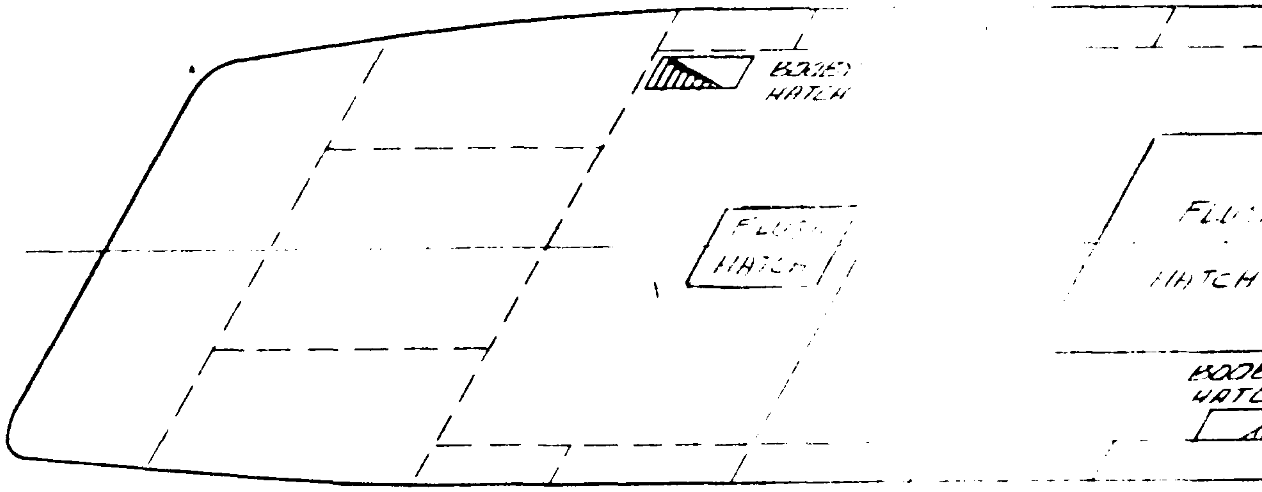


A-A

6

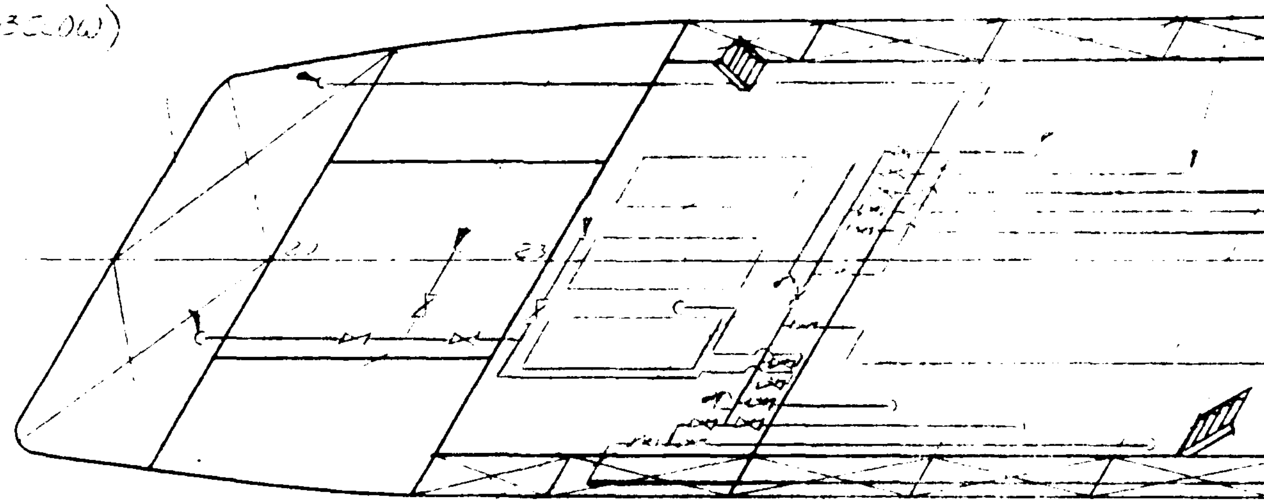
LIST OF MATERIALS

ITEM	QTY	DESCRIPTION	MATERIAL

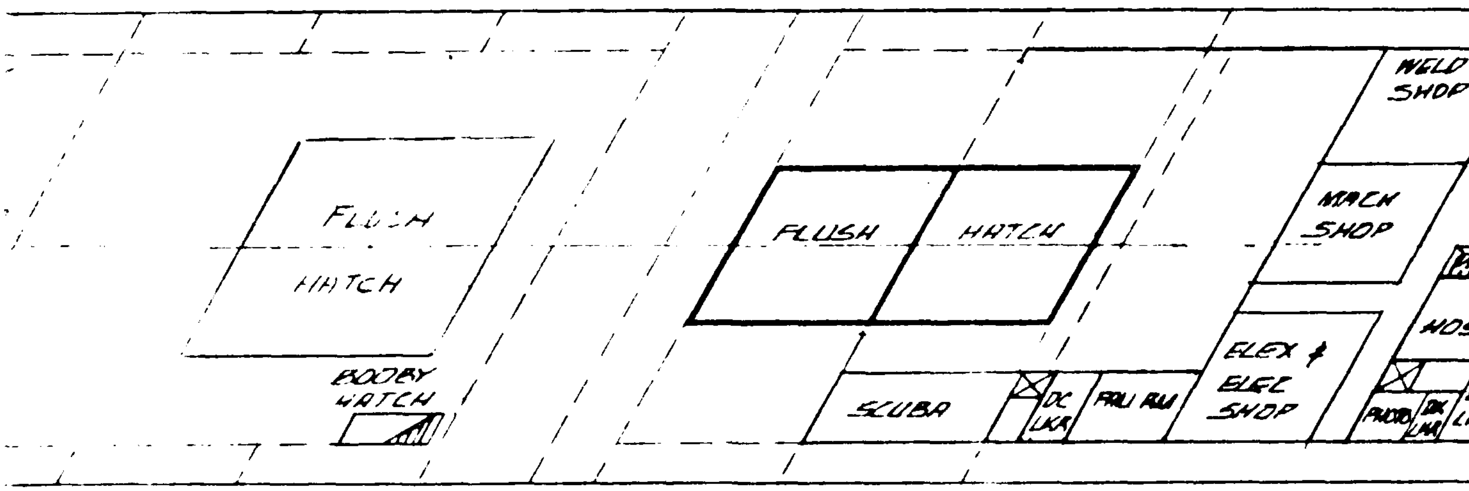


BILGE SUCTION

BALLAST(BELOW)

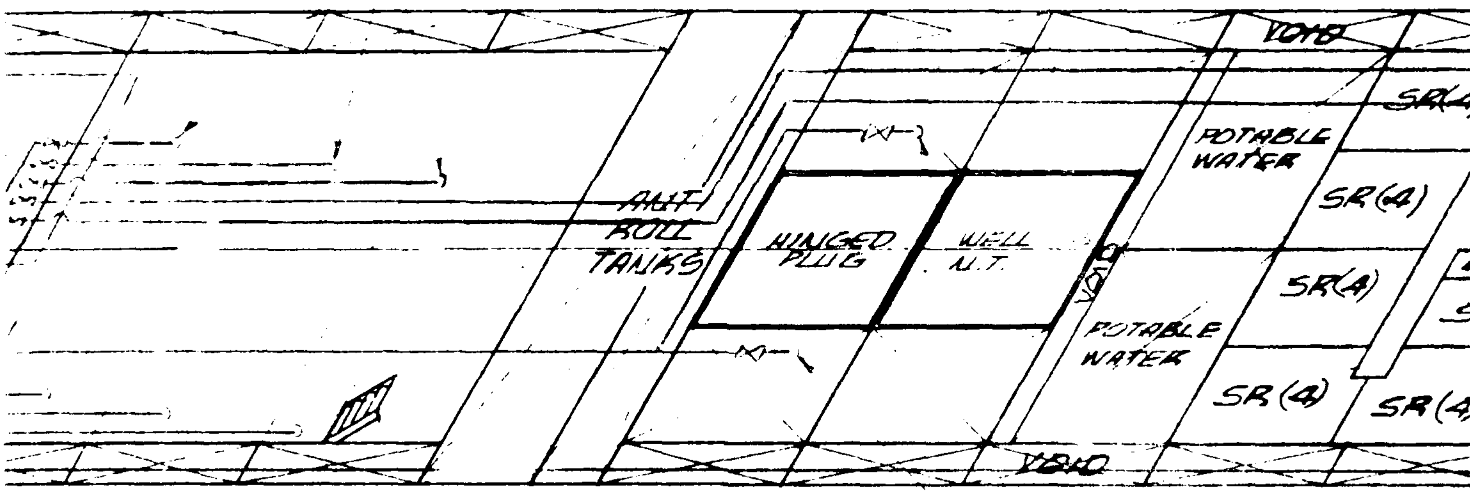


MANIFOLD PIPING
CONT DCT 13 B



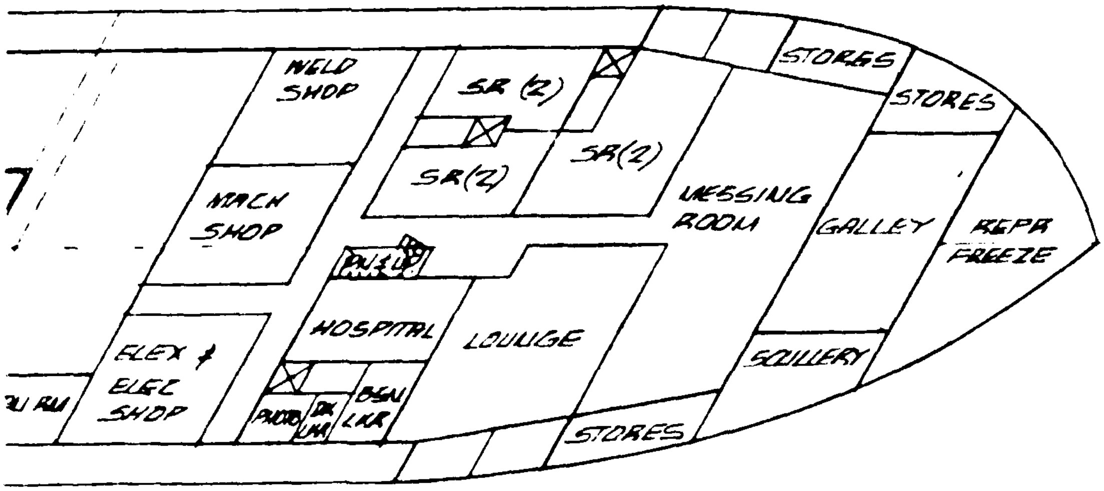
MAIN DECK

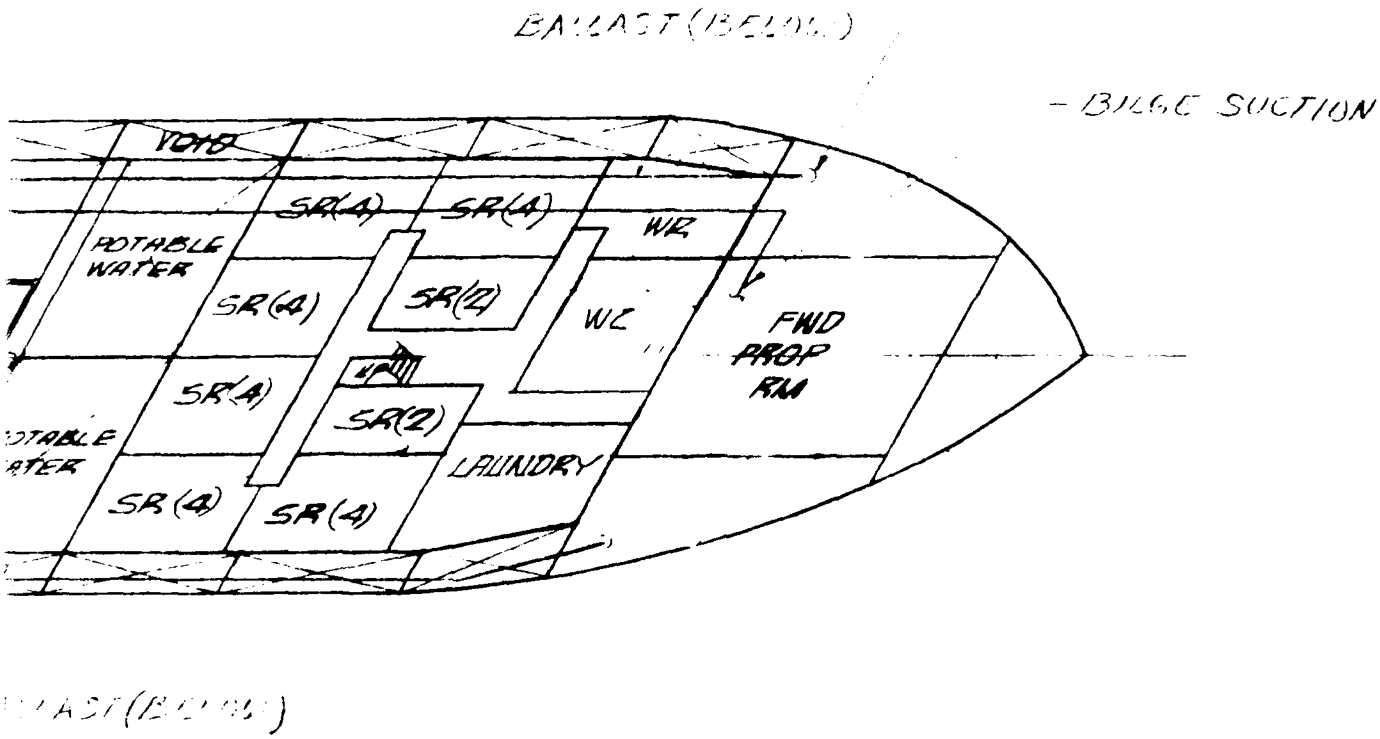
BALLAST (BELOW) P+S



BALLAST (BELOW)

2ND DECK


WELD SHOP
SR (2)
STORES
STORES
SR(2)
SR(2)
MACH SHOP
MESSING ROOM
GALLEY
REFR FREEZE
HOSPITAL
LOUNGE
ELEX & ELEC SHOP
SCULLERY
PHOTO
BSN LKR
STORES


BALLAST (BELOW)
- BILGE SUCTION
VOID
SR(4)
SR(4)
POTABLE WATER
WR
SR(4)
SR(2)
WC
FWD PROP RM
SR(4)
SR(2)
LAUNDRY
SR (4)
SR (4)

LEGEND

GLOBE VALVE
[illegible]
[illegible]
BALLAST PIPING
[illegible] PIPING

RESERVATI

BILGE SUCTION

	NO REQ'D		NEXT ASSEMBLY
			ALTERATION
			DATE
			SHIPYARD
			LOS ANGELES
			TECHNICAL SERVICES
			PURCHASING
			ESTIMATING
			USCG
			ABS

76

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NAVFAC (FPO-1)

WEST COAST OCEAN CONSTRUCTION PLATFORM

YFNB HULL CONVERSION BALLAST SYSTEM

NEXT ASSEMBLY
ALTERATION
DATE
SHIPYARD
LOS ANGELES
TECHNICAL SERVICES
PURCHASING
ESTIMATING
USCG
ABS

	DATES
ENGR.	
DFT.	20 APR
CHK.	20 APR
APPR.	
REL.	

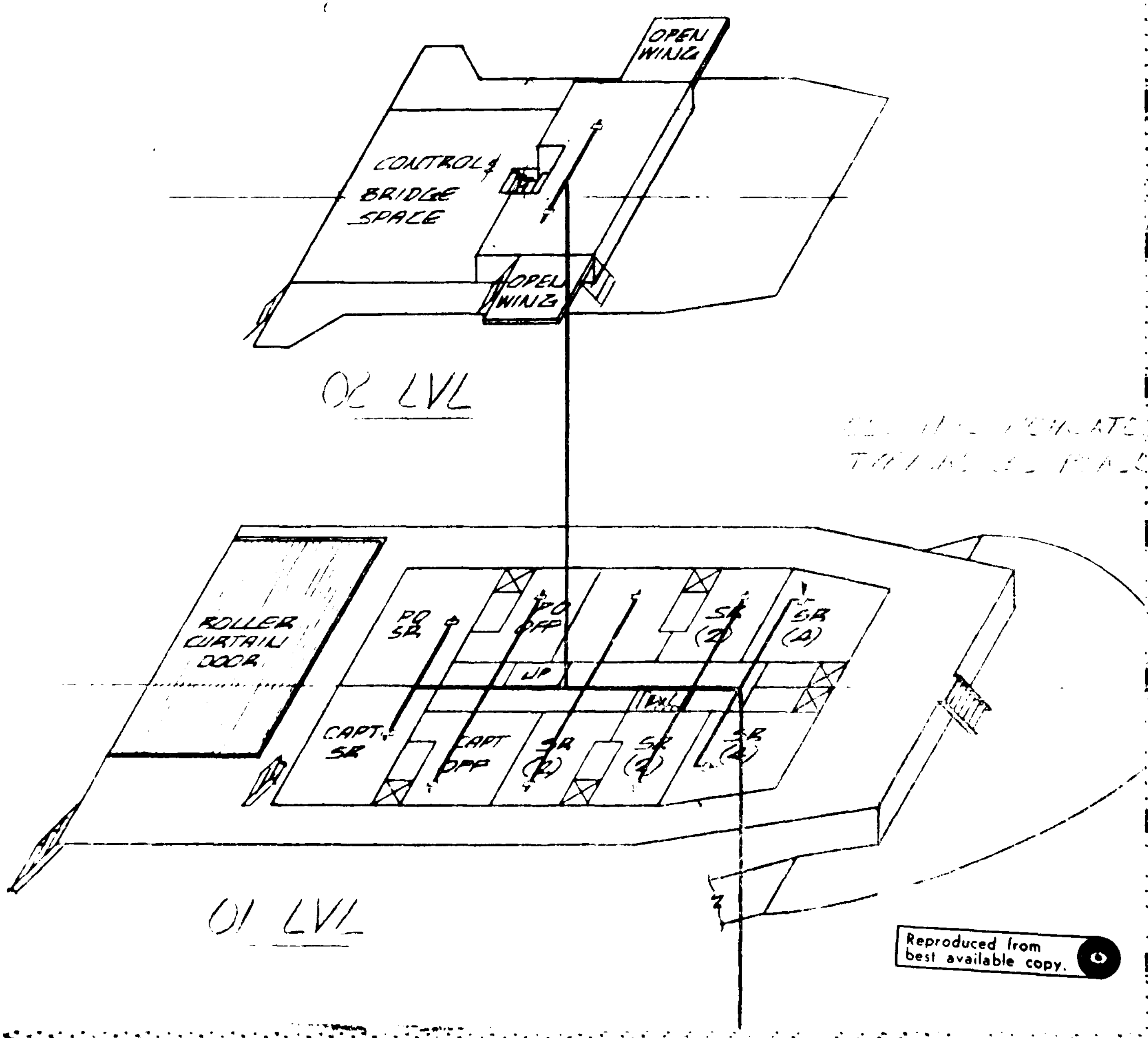
SCALE: NONE

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16" DECIMAL .00 = ± .03
ANGULAR ± ½° .000 = ± .010

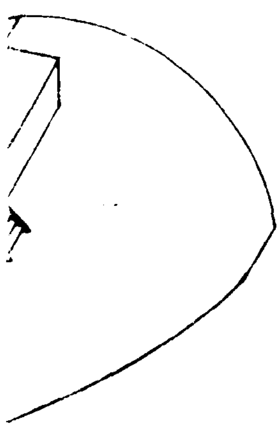
JOB AUTH.

DWG. NO. D • 4072 • P008

ALT A



Reproduced from best available copy.

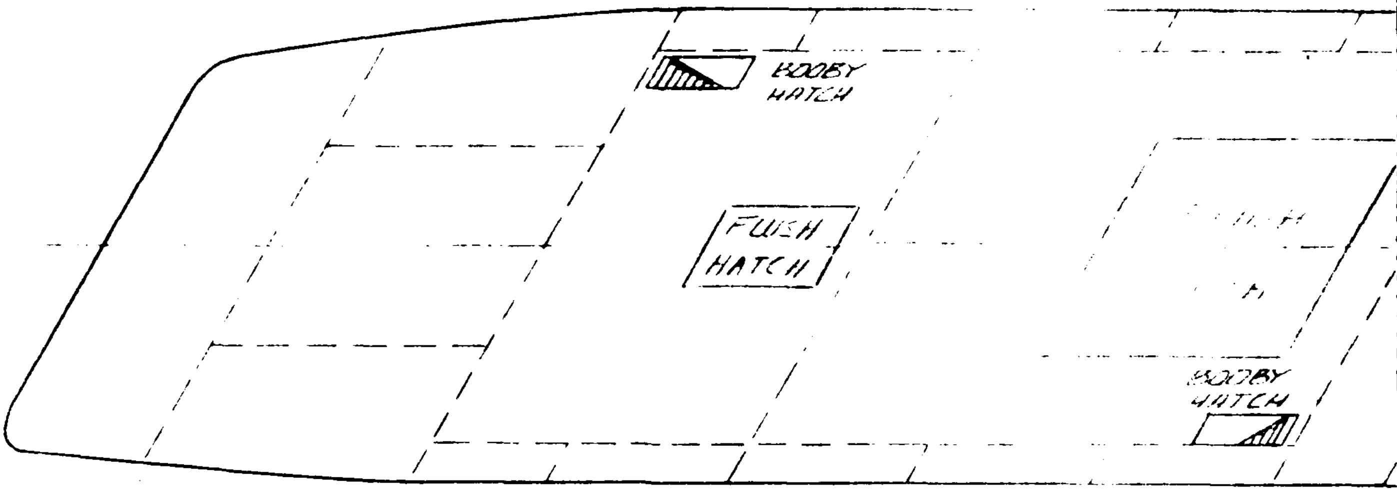


3

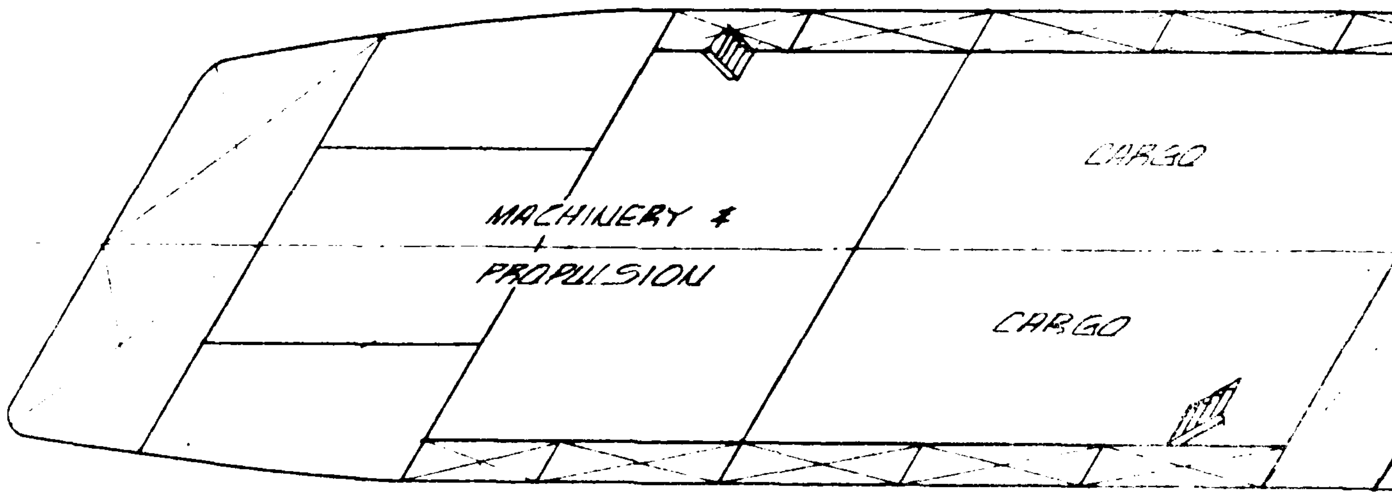
ITEM	QTY	DESCRIPTION	MATERIAL

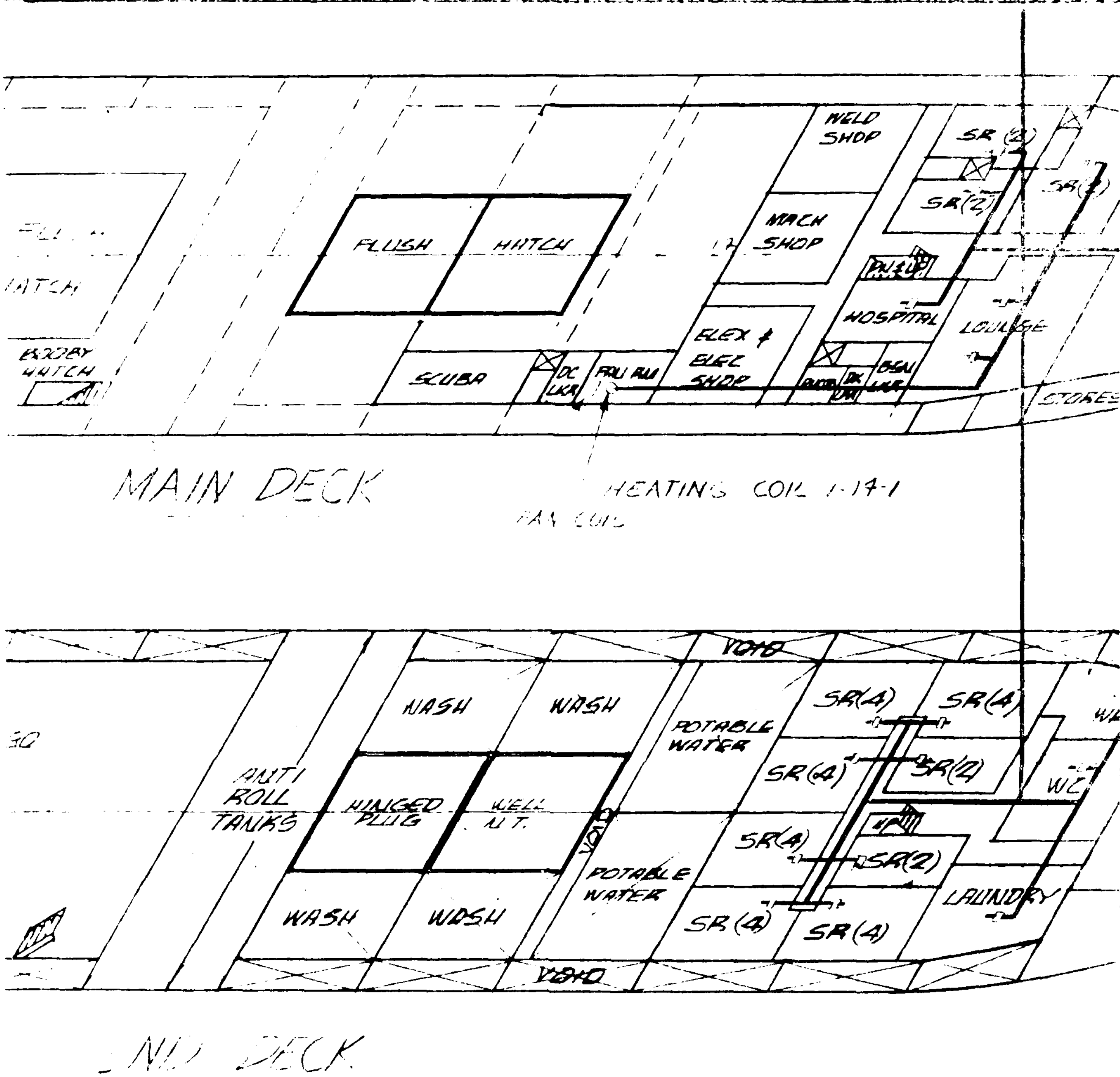
GENERAL NOTES:

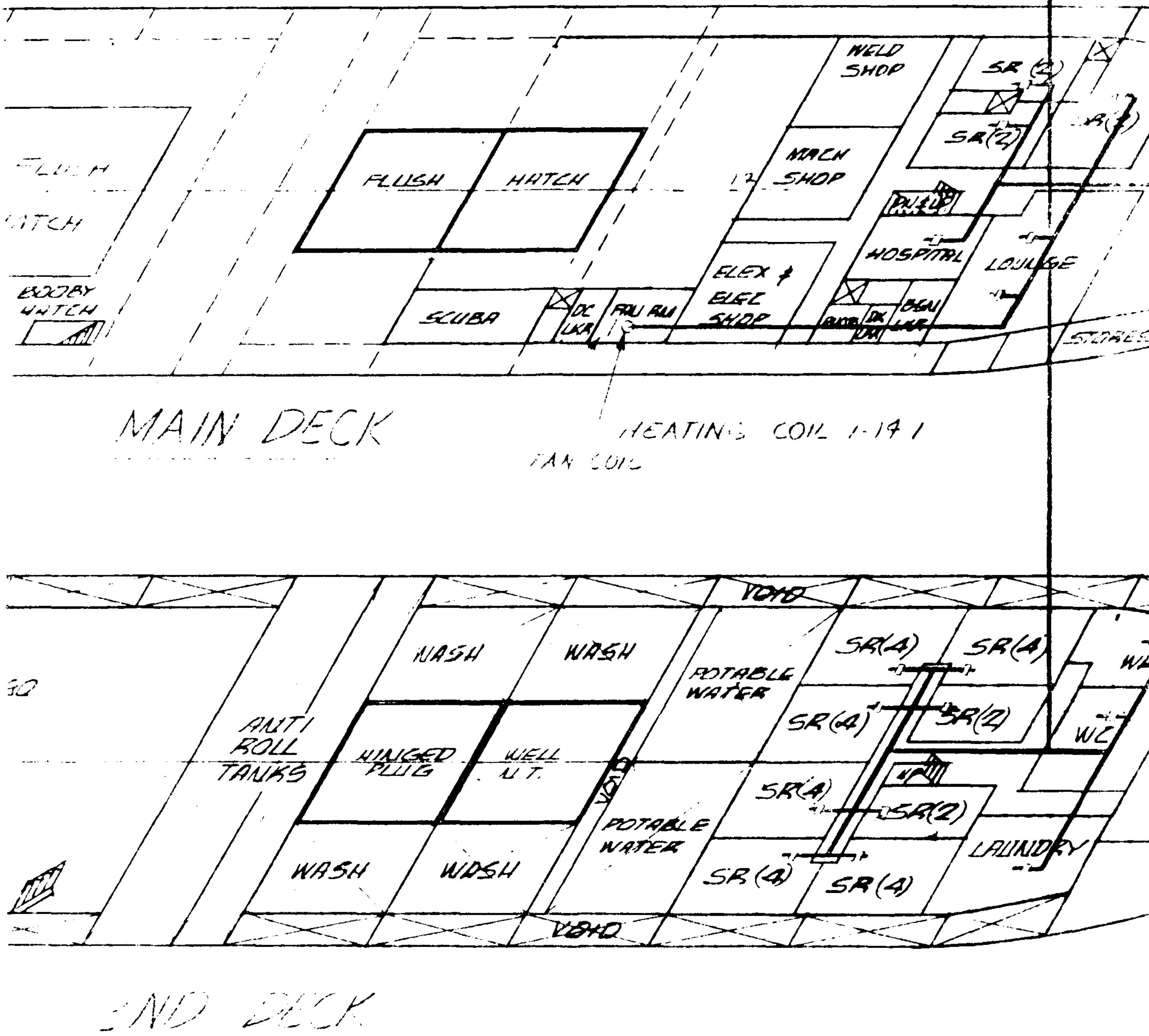
1. AIR VELOCITIES SHALL NOT EXCEED 2000 FPM IN LIVING SPACES AND 3000 FPM IN MACHINERY SPACES.
2. ALL DUCTS ARE TO BE GALVANIZED.
3. HAND HOLES AND ACCESS HOLES OF ADEQUATE SIZE SHALL BE PROVIDED IN TRUNKS TO PERMIT CLEANING OUT, PAINTING AND INSPECTION.
4. DUCTS PASSING OVER ELECTRICAL EQUIPMENT SHALL BE WATERTIGHT AND INSULATED TO PREVENT CONDENSATION FROM DRIPPING ON EQUI[illegible]


BOOBY HATCH
FLUSH HATCH
BOOBY HATCH

MA

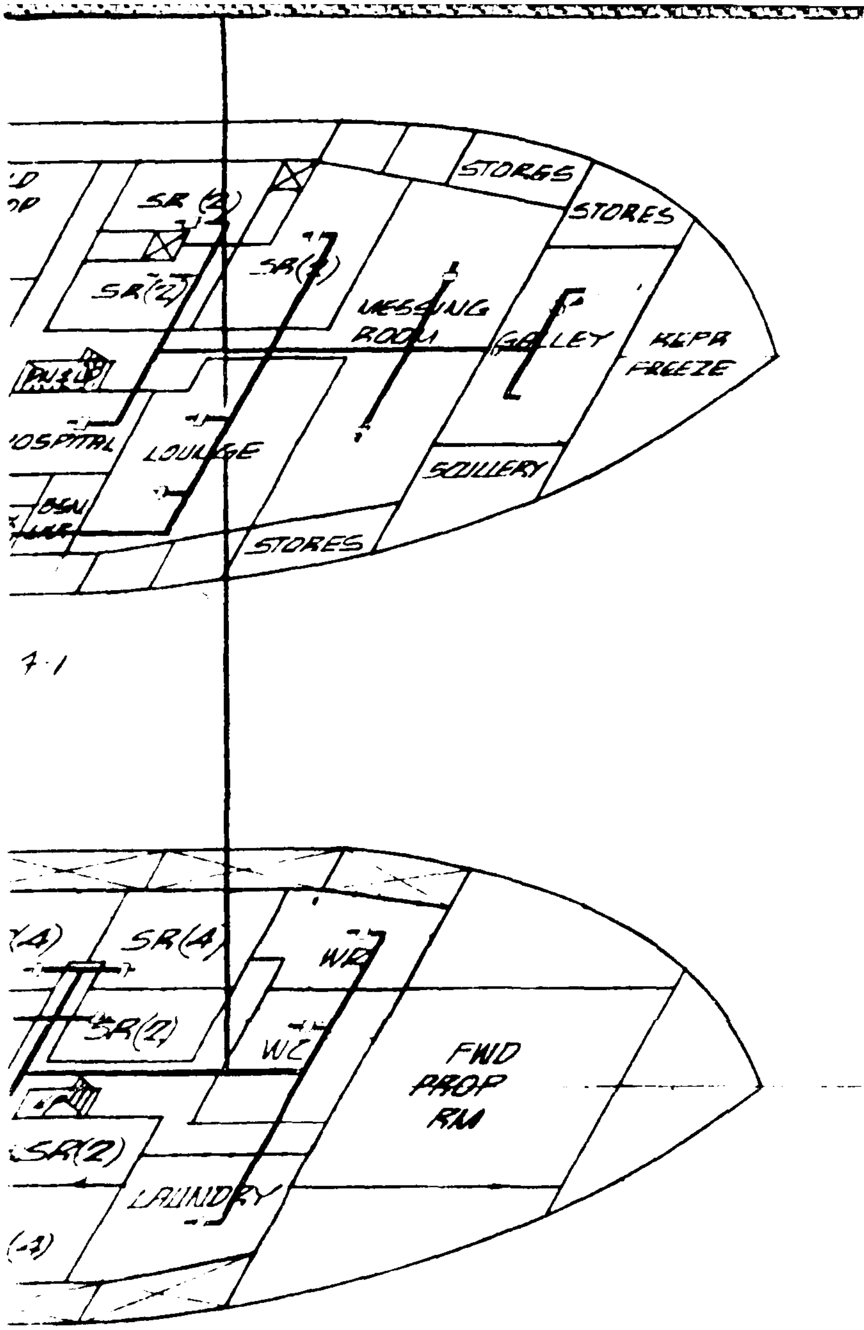

MACHINERY &
PROPULSION
CARGO
CARGO


WELD SHOP
SR (2)
SR (2)
SR (2)
MACH SHOP
FLUSH
HATCH
HOSPITAL
LOUNGE
BOOBY HATCH
SCUBA
DC LKR
ELEX & ELEC SHOP
STORES
MAIN DECK
HEATING COIL 1-14-1
FAN COIL
VOID
WASH
WASH
SR(4)
SR(4)
POTABLE WATER
ANTI ROLL TANKS
HINGED PLUG
SR(4)
SR(2)
WC
VOID
SR(4)
SR(2)
POTABLE WATER
LAUNDRY
WASH
WASH
SR (4)
SR (4)
VOID
2ND DECK



WELD SHOP
SR(2)
MACH SHOP
FLUSH
HATCH
HOSPITAL
LOUNGE
ELEX & ELEC SHOP
SCUBA
DC LKR
BOOBY HATCH
STORES
MAIN DECK
HEATING COIL
FAN COIL
VOID
WASH
POTABLE WATER
SR(4)
ANTI ROLL TANKS
HINGED PLUG
WELL N.T.
WC
LAUNDRY

HEATING COIL



6 DRAI PLUGS OR DRAINS & PIPING SHALL
AT LOW POINTS WHERE THERE IS A POSSIB
CONDENSATION COLLECTING.

7. THE HEATING & AIR CONDITIONING SYSTEM
WITH AIR FILTERS OF THE VISCOUS WASHA

RESERVATION

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NO	DATE	BY	

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DEVEL

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THE PRIOR WRITTEN CONSENT OF GLOBAL MARINE DE
TO GLOBAL MARINE DEVELOPMENT, INC. ON REQUEST.

NAVFAC
WEST COAST OCEAN CO
NB HULL CONVERSION

	NO REQ'D		NEXT ASSEMBLY
			ALTERATION
			DATE
			SHIPYARD
			LOS ANGELES
			TECHNICAL SERVICES
			PURCHASING
			ESTIMATING
			USCG
			ABS

		DATES
ENGR.		
DFT.		
CHK.	PF	
APPR.		
REL.		

SCALE: NTS

JOB AUTH. 09072

GENERAL NOTES:

1. AIR VELOCITIES SHALL NOT EXCEED 2000 FPM IN LIVING SP[illegible] AND 3000 FPM IN MACHINERY SPACES.
2. ALL DUCTS ARE TO BE GALVANIZED.
3. HAND HOLES AND ACCESS HOLES OF ADEQUATE SIZE SHALL BE PROVIDED IN TRUNKS TO PERMIT CLEANING OUT, PAINTING AND INSPECTION.
4. DUCTS PASSING OVER ELECTRICAL EQUIPMENT SHALL BE WATERTIGHT AND INSULATED TO PREVENT CONDENSATION FROM DRIPPING ON EQUIPMENT.
5. BRANCHES SHALL BE TAKEN FROM DUCTS AT AN ANGLE OF 30°.
6. DRAIN PLUGS OR DRAINS & PIPING SHALL BE PROVIDED AS REQUIRED AT LOW POINTS WHERE THERE IS A POSSIBILITY OF WATER OR CONDENSATION COLLECTING.
7. THE HEATING & AIR CONDITIONING SYSTEM SHALL BE PROVIDED WITH AIR FILTERS OF THE VISCOUS WASHABLE TYPE.

[illegible]RVATION
[illegible] DRAWING IS FOR ESTIMATING ONLY. NOT FOR CONSTRUCTION.

NO	DATE	BY	DESCRIPTION	APPROVED
ALTERATIONS				

(9)

GLOBAL MARINE
[illegible]LOPMENT [illegible]

RANCHES SHALL BE TAKEN FROM T S AT

RAIN PLUGS OR DRAINS & PIPIN SHALL BE PROVIDED REQUIRED
T LOW POINTS WHERE THERE IS A POSSIBILITY OF WATER OR
ONDENSATION COLLECTING.

HE HEATING & AIR CONDITIONING SYSTEM SHALL BE PROVIDED
ITH AIR FILTERS OF THE VISCOUS WASHABLE TYPE.

IS FOR ESTIMATING ONLY. NOT FOR CONSTRUCTION.

NO	DATE	BY	DESCRIPTION	APPROVED

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NAVFAC CPL-1
WEST COAST OCEAN CONSTRUCTION PLATFORM
... HEATING & AIR COND ...

BLY
ON
VICES

		DATES
ENGR.		4-72-76
DFT.		7-5-76
CHK.	PF	5/76
APPR.		
REL.		

SCALE: NTS

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16" DECIMAL .00 = ± .03
ANGULAR ± 1° .000 = ± .010

JOB AUTH. 07072 010000

DWG. NO. D•4072•P009

ALT A

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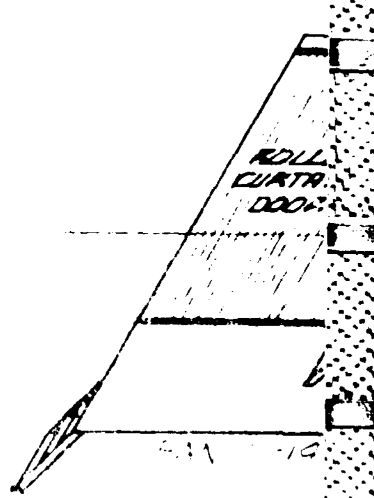
(1)

WTC 03-14-1



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WTC 1-21-6

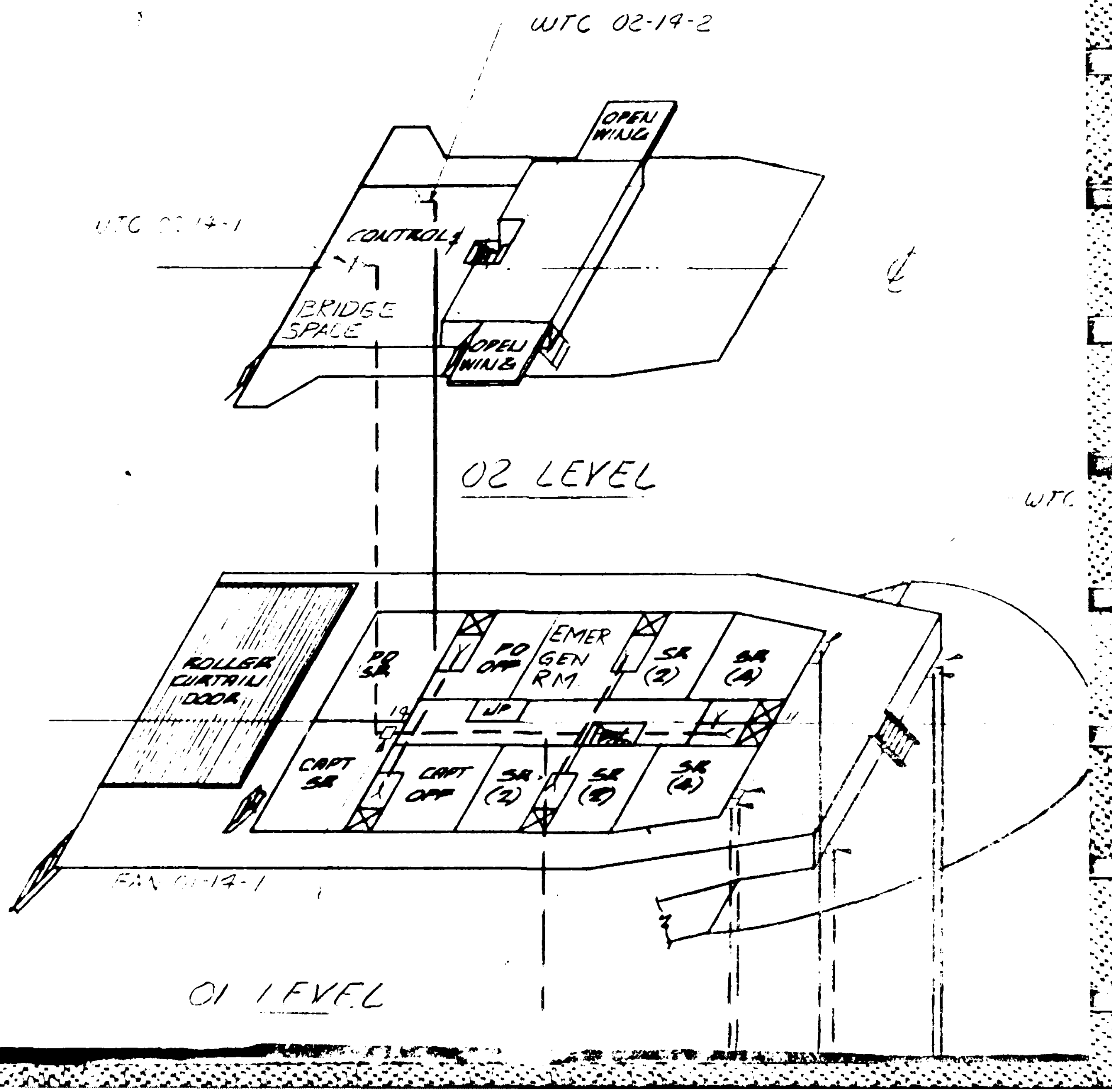
WTC 1-21-4

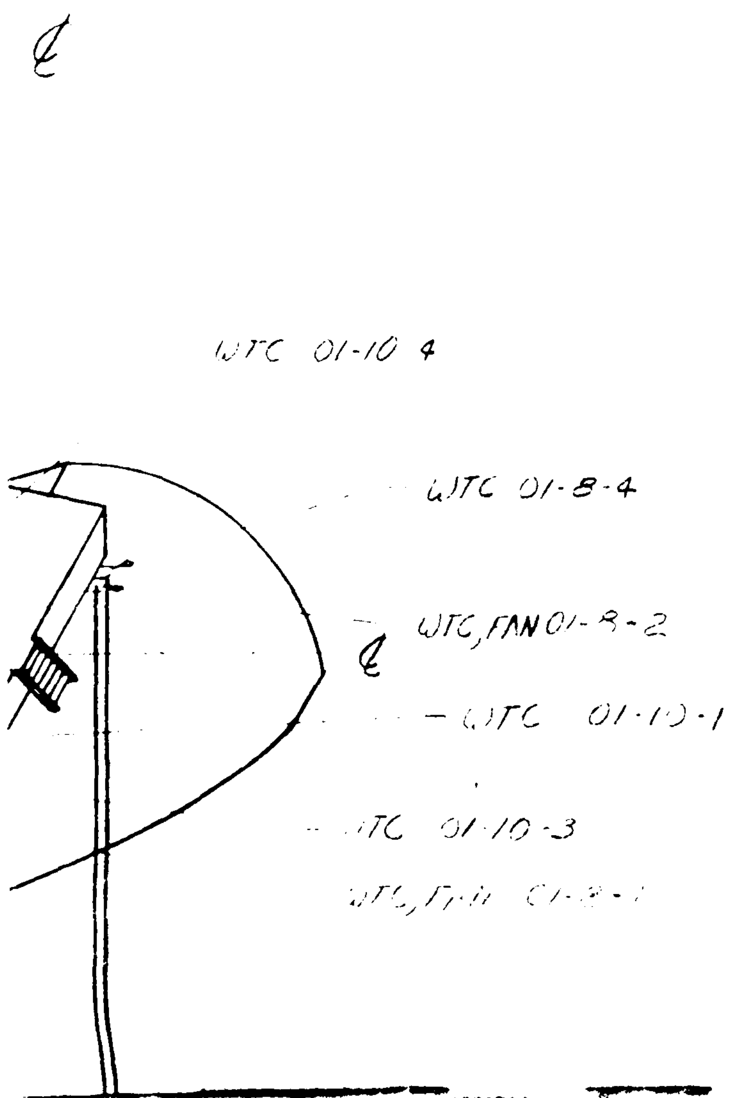
WTC 1-21-8

WTC 1-21-2

01

(2)


WTC 02-14-2
OPEN WING
CONTROLS
BRIDGE SPACE
OPEN WING
02 LEVEL
WTC
ROLLER CURTAIN DOOR
PO SR
PO OFF
EMER GEN RM
SR (2)
SR (4)
WP
CAPT SR
CAPT OFF
SR (2)
SR (2)
SR (4)
01 LEVEL


WTC 01-10 4
WTC 01-8-4
WTC, FAN 01-8-2
WTC 01-10-1
WTC 01-10-3

(4)

LIST OF MATERIALS

ITEM	QTY	DESCRIPTION

GENERAL NOTES:

1. NATURAL SUPPLY AND EXHAUST DUCTS SHALL BE SIZE VELOCITY OF 1000 FPM MAX.
2. HAND HOLES AND ACCESS HOLES OF ADEQUATE SIZE PROVIDED IN TRUNKS TO PERMIT CLEANING OUT, PA INSPECTION.
3. DUCTS PASSING OVER EQUIPMENT SHALL BE WATER T INSULATED TO PREVENT CONDENSATION FROM DRIPPI
4. BRANCHES SHALL BE TAKEN FROM DUCTS AT AN ANGL THE DIRECTION OF THE AIR FLOW.
5. FILTERS OF THE VISCOUS WASHABLE TYPE SHALL BE

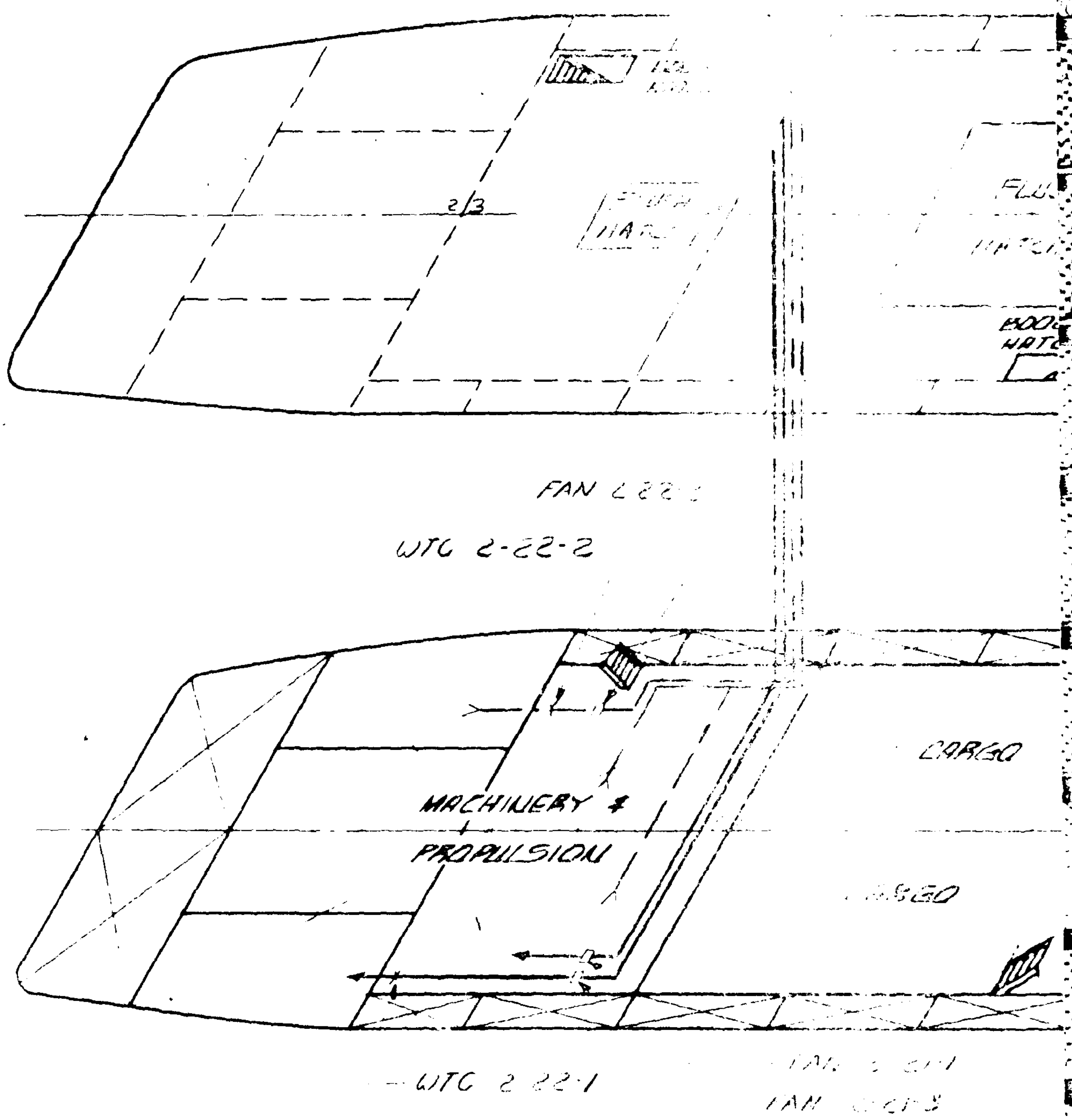
5.

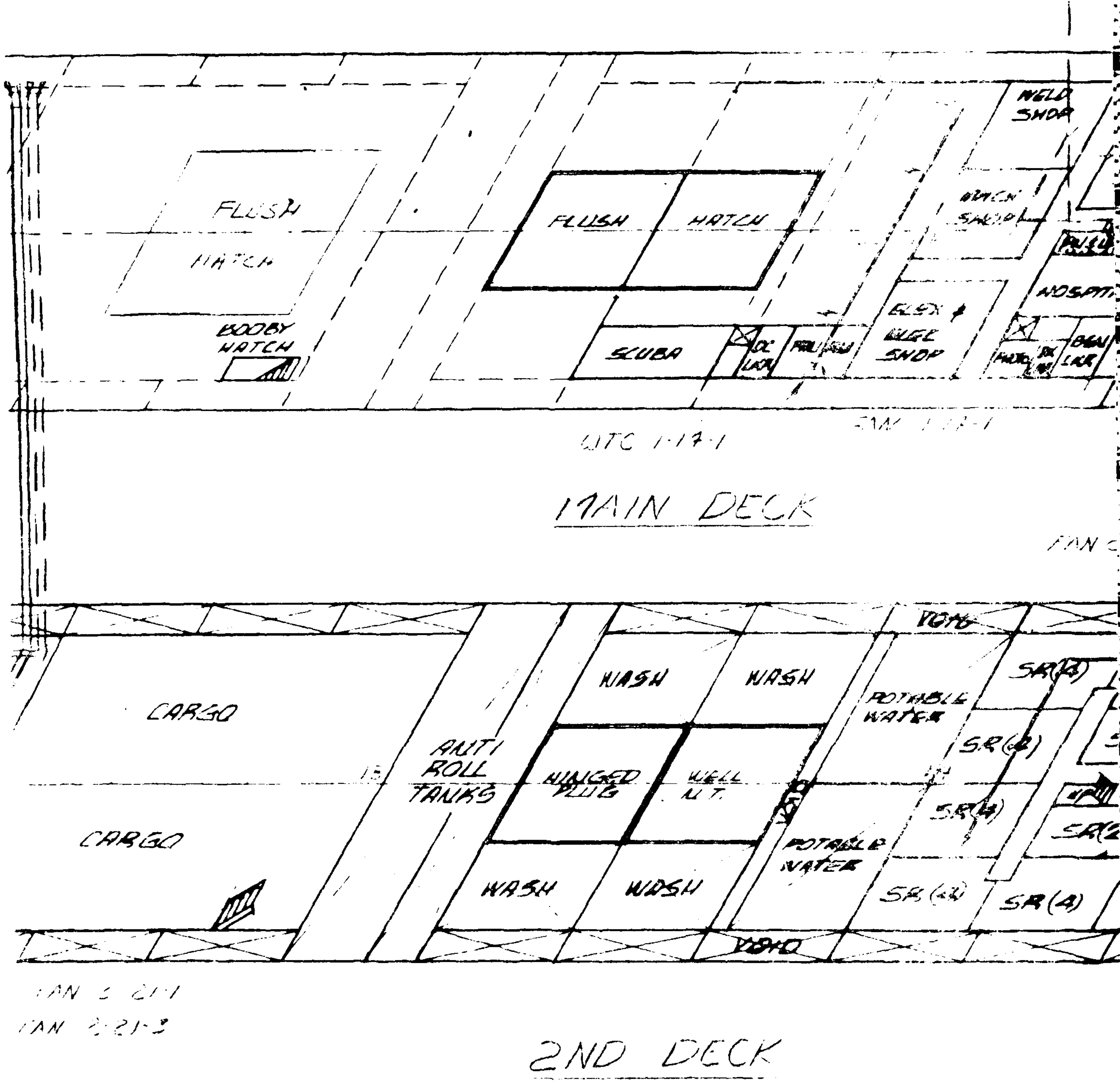
LIST OF MATERIALS

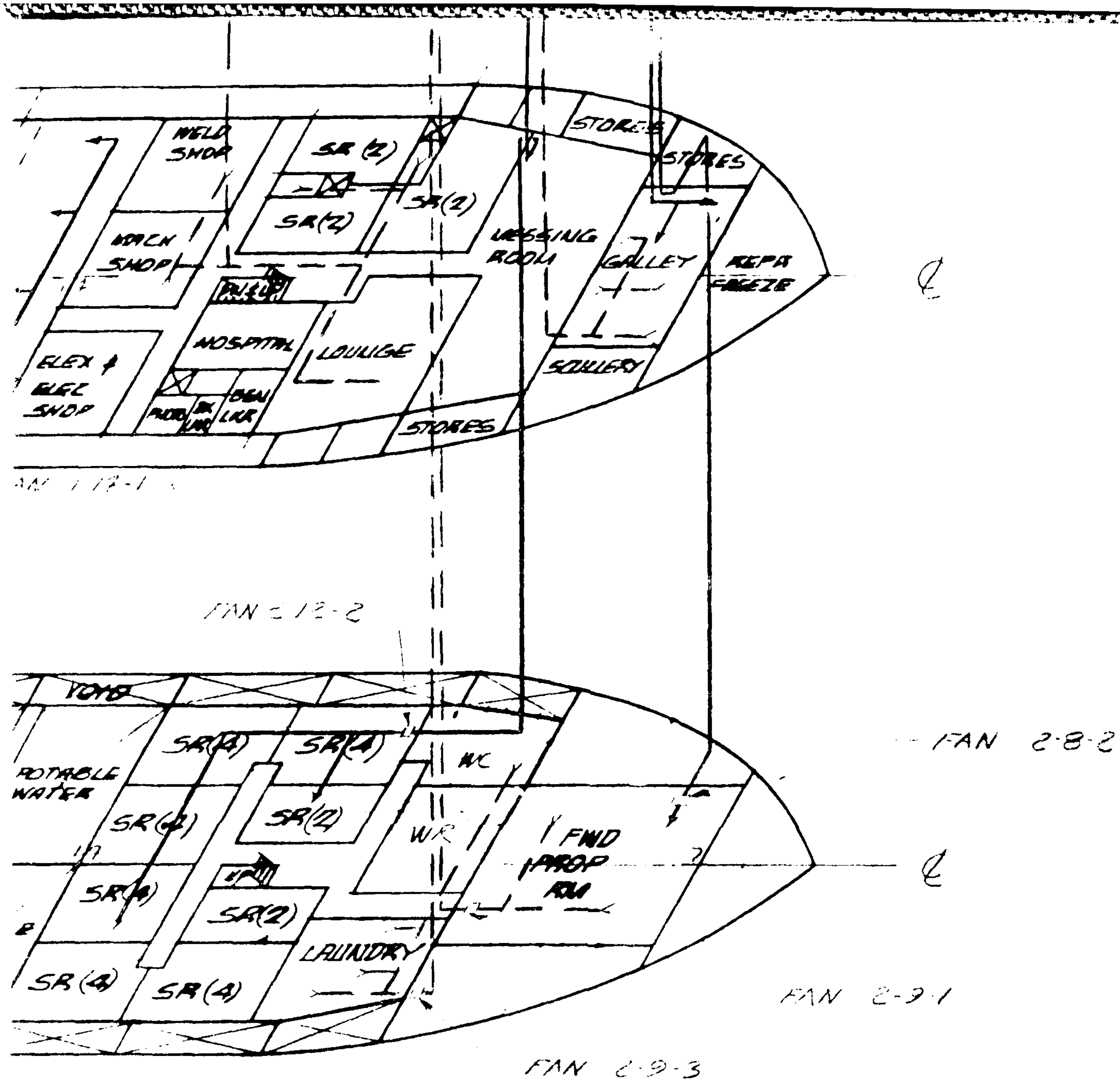
QTY	DESCRIPTION	MATERIAL

·Y AND EXHAUST DUCTS SHALL BE SIZED FOR A
·000 FPM MAX.
·D ACCESS HOLES OF ADEQUATE SIZE SHALL BE
·RUNKS TO PERMIT CLEANING OUT, PAINTING AND

· OVER EQUIPMENT SHALL BE WATER TIGHT AND
PREVENT CONDENSATION FROM DRIPPING ON EQUIPMENT.
·L BE TAKEN FROM DUCTS AT AN ANGLE OF 30° IN
· OF THE AIR FLOW.
·E VISCOUS WASHABLE TYPE SHALL BE UTILIZED.


2/3
FAN 2-22-2
WTC 2-22-2
MACHINERY &
PROPULSION
CARGO
CARGO
WTC 2-22-1


WELD SHOP
FLUSH HATCH
FLUSH HATCH
BOOBY HATCH
SCUBA
ELEX & ELEC SHOP
MAIN DECK
VOID
WASH
WASH
CARGO
POTABLE WATER
SR(4)
ANTI ROLL TANKS
HINGED PLUG
WELL M.T.
CARGO
POTABLE WATER
WASH
WASH
SR(4)
SR(4)
VOID
2ND DECK



WELD SHOP
SR (2)
STORES
STORES
SR(2)
SR(2)
MACH SHOP
MESSING ROOM
GALLEY
REFR FREEZE
HOSPITAL
LOUNGE
ELEX & ELEC SHOP
PHOTO
SCULLERY
STORES
FAN 2-12-2
VOID
SR(4)
SR(4)
FAN 2-8-2
POTABLE WATER
WC
SR(4)
SR(2)
WR
FWD PROP RM
SR(4)
SR(2)
LAUNDRY
SR (4)
SR (4)
FAN 2-9-1
FAN 2-9-3

RESERVATION

THIS DRAWING IS FOR E

LEGEND

—— SUPPLY

– – – EXHAUST

AN 2 8 2

NO	DATE

	NO REQ'D		NEXT ASSEMBLY
			ALTERATION
			DATE
			SHIPYARD
			LOS ANGELES
			TECHNICAL SERVICES
			PURCHASING
			ESTIMATING
			USCG
			ABS

WES

YFNB

ENGR.	
DFT.	
CHK.	PF
APPR.	
REL.	

9

RESERVATION

THIS DRAWING IS FOR ESTIMATING ONLY. NOT FOR CONSTRUCTION.

NO	DATE	BY	DESCRIPTION	APPROVED

ALTERATIONS

GLOBAL MARINE DEVELOPMENT Inc.
Los Angeles, Calif.

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NAVFAC (FPO-1)
WEST COAST OCEAN CONSTRUCTION PLATFORM
YFNB HULL CONVERSION VENTILATION SYSTEM

ASSEMBLY
ERATION
LES
L SERVICES
NG
G

		DATES
ENGR.		
DFT.		20 APR
CHK.	PF	20 APR
APPR.		
REL.		

SCALE:

TOLERANCE UNLESS OTHERWISE NOTED
FRACTION ± 1/16" DECIMAL .00 = ± .03
ANGULAR ± ½° .000 = ± .010

JOB AUTH.	DWG. NO.	ALT
	D • 4072 • V001	A

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TELEPHONE CONVERSATION WITH DR. SHUN LING OF FPO-1, 0830, 5 MAY 1978

Dr. Ling passed the following estimated crew sizes to be used in the economic part of the study:

- St. Croix range type of scenarios

Crew	16
UCT	7
Project	19-24
TOTAL	42-47

- SQUAW moor scenarios

Crew	15
Project	12
TOTAL	27

- SEACON II scenarios

Crew	14
Project	20
UCT	4
TOTAL	38

TELEPHONE CONVERSATION WITH DR. SHUN LING OF FPO-1, 1000, 19 MAY 1978

Dr. Ling passed on the following decisions on configuration for the YFNB:

- utilize pedestal cranes instead of gantry
- utilize cycloidal propulsion instead of nozzled thrusters

Also the decision has been made to recommend the YFNB concept instead of the ex-drillship.

APPENDIX N

YFNB LIGHT SHIP ESTIMATE;
TRIM AND STABILITY SUMMARIES

ESTIMATE OF WEIGHT FOR SHIPS, WORK SHEET
NAVSHIPS 9018A-2 (11-57)

SUMMARY WEIGHT CHANGES AND NEW LIGHTSHIP

YFNB CONVERSION

BUDGET BUREAU NO. 45-R281
REPORT-BUSHIPS-9281-4

DATE

DESCRIPTION	WEIGHT (Tons)	CENTER OF GRAVITY: ABOVE BASE	MOMENTS	REFERRED TO FRAME NO. 17: FWD	MOMENTS	AFT	MOMENTS	REFERRED TO: PORT	MOMENTS	ST'BD	MOMENTS
Lightship Seacon	1420	(1430)	20303	(4.08)	5793.6						
Page 2	172.08		2289.37				3930.88				
Page 3	- 100.15		- 2179.87				- 3532.84				
Page 4	- 11.34		- 423.85		- 895.00						
Water in Anti Roll Tank (16 x 48 x 6)	- 131.66	6.0	- 789.94	-		-					
Lightship YFNB Conversion	1348.9	14.23	19198.7	3.34	4500.6						
TOTALS TONS											

COMPUTING BY

COMPUTING CHECKED

WEIGHT ADDITIONS (MACHINERY)

ESTIMATE OF WEIGHT FOR SHIPS, WORK SHEET
NAVSHIPS 4616A-2 (11-67)

YFNB CONVERSION

BUDGET BUREAU NO. 46-R281
REPORT-BUSHIPS-9281-6

DATE

DESCRIPTION	WEIGHT (Tons)	CENTER OF GRAVITY: ABOVE BASE	MOMENTS	REFERRED TO FRAME NO. 17: FWD	MOMENTS	AFT	MOMENTS	REFERRED TO: PORT	MOMENTS	STB'D	MOMENTS
Diesel Gen Cat D398 (3)	25.33	6.67	168.95			86	2178.38				
Diesel Gen Cat 3406	2.24	29.5	66.08	64	143.36						
SCR Modules	2.68	7.0	18.76			53.5	143.38				
Generator Control Modules	0.54	8.0	4.32			53.5	28.89				
Emer Gen Control Module	0.13	31.5	4.10	59	7.67						
Motor Control Modules	0.94	8.0	7.52			63.5	59.69				
Size 3 Starters	0.64	6.9	4.42			63.5	40.64				
Size 1 Starters	1.04	8.2	8.53			63.5	66.04				
Size 2 Starters	0.78	8.2	6.40			63.5	49.53				
GE F52 Aux Starters	0.24	8.0	1.92			63.5	15.24				
Fwd 800 HP Thruster w/ Mtr	16.52	0.63	10.41	104	1718.08						
(2) Aft 500 HP Thrusters w/ Mtr	25.89	3.98	103.04			104	2692.56				
Mooring Winch (MD97)	22.77	28.0	637.56	113	2573.01						
Additional Pumps	1.35	5.0	6.75			80	108.00				
Transformers 2 500 kva	2.09	6.0	12.52			49.5	103.46				
Transformer 112.5 kva	0.34	6.0	2.04			49.5	16.83				
Wash Water Eq & Pump	0.56	6.0	3.36	93	52.08						
Additional Vent & Eq	0.22	12.0	2.64			86	18.92				
50T Crane (ABS 218)	36.22	18.0	651.96	--		--					
40T Crane (ABS 138)	31.56	18.0	568.08			92	2903.52				
TOTALS TONS	172.08		2289.37				3930.88				

COMPUTING BY

COMPUTING CHECKED

WEIGHT REMOVALS (MACHINERY)

ESTIMATE OF WEIGHT FOR SHIPS, WORK SHEET
NAVSHIPS 4616A-2 (11-57)

YFNB CONVERSIONS

BUDGET BUREAU NO. 46-R281
REPORT-BUSHIPS-8201-4

DATE

DESCRIPTION	WEIGHT (Tons)	CENTER OF GRAVITY ABOVE BASE	MOMENTS	REFERRED TO FRAME NO. 17 FWD	MOMENTS	AFT	MOMENTS	REFERRED TO PORT	MOMENTS	ST'BD	MOMENTS
Fwd Diesel Prop Engine	2.20	6.0	13.20	98	215.60						
Aft Diesel Prop Engines	4.59	7.0	32.13			100	459.00				
Voit-Schneider Fwd	0.75	-1.3	- 0.98	110	82.50						
Voit-Schneider Aft	1.50	1.5	2.25			112	168.00				
Misc Prop Aux	0.50	3.5	1.75	-		-					
Ship Service Diesels	4.67	5.5	25.69	64	298.88						
Emergency Diesel	1.34	29.5	39.53	24	32.16						
Emergency Control Module	0.13	31.5	4.10	24	3.12						
Ship Service Switchboard	0.54	8.0	4.32	50	27.00						
Gantry Crane 123,200#	55.00	29.0	1595.00			28	1540.00				
Gantry Crane Rails 64,800#	28.93	16.0	462.88			70	2025.10				
TOTALS TONS	- 100.15		- 2179.87				- 3532.84				

COMPUTING BY

COMPUTING CHECKED

WEIGHT MODIFICATIONS (STRUCTURAL)

ESTIMATE OF WEIGHT FOR SHIPS, WORK SHEET
NAVSHIPS 4816A-2 (11-57)

YFNB CONVERSION

BUDGET BUREAU NO. 45-R281
REPORT-BUSHIPS-8281-4

DATE

DESCRIPTION	WEIGHT (Tons)	CENTER OF GRAVITY										
		ABOVE BASE	MOMENTS	REFERRED TO FRAME NO. 17				REFERRED TO				
				FWD	MOMENTS	AFT	MOMENTS	PORT	MOMENTS	ST'BD	MOMENTS
Structural Upper Dks	3.43	43.0	147.49	42.0	144.06						
Joiner Bhd Fwd	13.53	14.7	198.89	65.0	879.45						
Structural Below Dks	5.81	8.1	47.06			27.0	156.87				
	22.77		393.44		866.64						
Structural Upper Dks	- 21.99	31.6	- 694.88	60.6	- 1332.59						
Joiner Bhd	- 12.12	10.1	- 122.41	35.4	- 429.05						
TOTALS TONS	- 11.34		- 423.85		- 895.00						

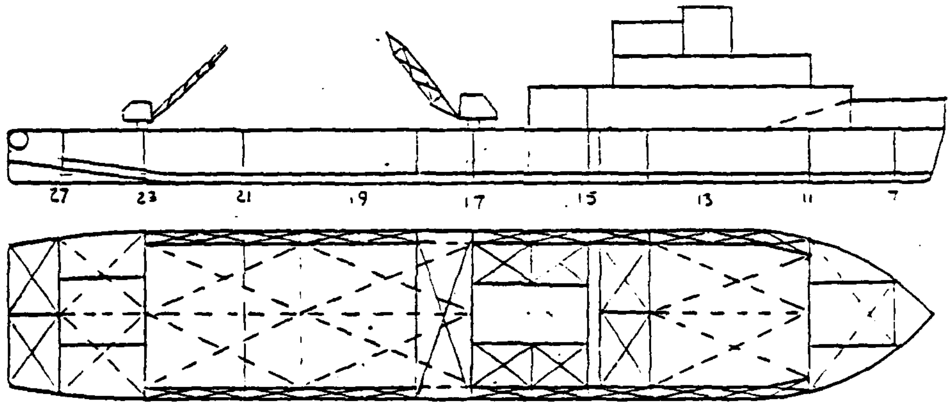
COMPUTING BY

COMPUTING CHECKED

TRIM & STABILITY SUMMARY

CONDITION OF VESSEL Lightship NO ____ | DATE April 1978 | PAGE 1

CARGO 0 % CONSUMABLES 0 % BALLAST 0 % | BY JCS | J/N 04072



REF LINE FOR V.C.G. Base Line

REF LINE FOR L.C.G. FR 17/⌀/+ Fwd

SYMBOL	COMPARTMENT	CU FT TON	WEIGHT TONS	VCG ABV BL FT	MOMENT ABT BL FT TONS	LCG ABT ⌀ FT	MOMENT ABT ⌀ FT. TONS	VERT MOM OF F.S FT. TONS
DEADWEIGHT								
LIGHT SHIP			1348.9	14.23	19198.7	3.34	4500.6	
DISPLACEMENT								

TRIM

- DRAFT AT LCF = 5.19 FT
- MOMENT TO ALTER TRIM 1" = 399.1 FT-LT
- LCB (~~AFT~~, FWD) OF ⌀ = 4.07 FT
- LCG (~~AFT~~, FWD) OF ⌀ = 3.34 FT
- TRIMMING LEVEL = 0.63 FT
- TRIM (BY STERN, ~~HEAD~~) = 0.18 FT
- LCF (AFT, ~~FWD~~) OF ⌀ = 0.67 FT
- DRAFT AT FP = 5.10 AP = 5.28

DRAFTS AT DRAFT MARKS

MEAN 5.19

FWD = ______ AFT = ______

STABILITY

- METACENTER ABOVE BL $\overline{KM}$ = 42.05 FT
- CENTER OF GRAVITY ABV BL $\overline{KG}$ = 14.23 FT
- METACENTRIC HEIGHT $\overline{GM}$ = 27.82 FT
- FREE SURFACE (F.S.) = - FT
- $\overline{GM}$ CORRECTED FOR (F.S.) = 27.82 FT
- $\overline{GM}$ REQUIRED = ______ FT
- MARGIN = ______ FT
- MOMENT TO HEEL 1° = ______ FT-LT

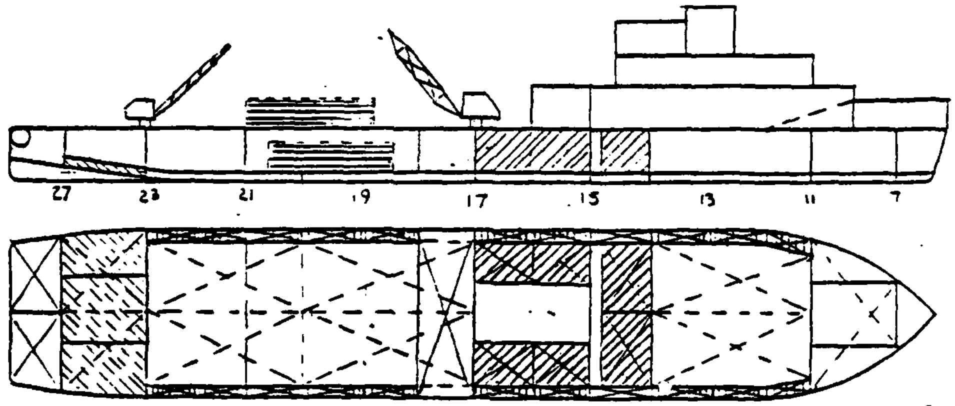
GLOBAL MARINE DEVELOPMENT INC.
KOLL CENTER NEWPORT
4100 MacArthur Boulevard
Newport Beach, California 92660

SYMBOLS
= S.W.
= F.W.
= OIL CARGO
= BULK CARGO
= DRY CARGO
= FO or DO

TRIM & STABILITY SUMMARY

CONDITION OF VESSEL Full Load NO ______ DATE April 1978 PAGE 2

CARGO 100 % CONSUMABLES 100 % BALLAST 14 % BY JCS J/N 04072



REF LINE FOR V.C.G. Base Line REF LINE FOR L.C.G. FR 17/⌀/+ Fwd

SYMBOL	COMPARTMENT	CU FT TON	WEIGHT TONS	VCG ABV BL FT	MOMENT ABT BL FT TONS	LCG ABT ⌀ FT	MOMENT ABT ⌀ FT. TONS	VERT MOM OF F. S. FT. TONS
	Crew & Effects		6	20.0	120	72.0	432	
	Stores & Provisions		45	18.0	810	92.0	4140	
	Fuel		403		3707		- 3494	
	Potable Water		170		1529		7049	
	Wash Water		251		2258		4013	
	Deck Load		100	19.0	1900	- 56.0	- 5600	
	Cargo Hold		100	8.0	800	- 40.0	- 4000	
	Ballast (No. 4)		96		479		- 9960	
	Lube Oil		2		19		- 151	
DEADWEIGHT			1173		11622		- 7571	
LIGHT SHIP			1349		19199		4501	
DISPLACEMENT			2522	12.22	30821	- 1.22	- 3070	

TRIM

DRAFT AT LCF = 9.13 FT

MOMENT TO ALTER TRIM 1" = 493.7 FT-LT

LCB (~~AFT~~, FWD) OF ⌀ = 0.36 FT

LCG (AFT, ~~FWD~~) OF ⌀ = 1.22 FT

TRIMMING LEVEL = 1.58 FT

TRIM (BY STERN, ~~HEAD~~) = 0.67 FT

LCF (AFT, ~~FWD~~) OF ⌀ = 6.57 FT

DRAFT AT FP = 8.78 AP = 9.45

DRAFTS AT DRAFT MARKS

MEAN 9.12

FWD = ______ AFT = ______

STABILITY

METACENTER ABOVE BL $\overline{KM}$ = 27.15 FT

CENTER OF GRAVITY ABV BL $\overline{KG}$ = 12.22 FT

METACENTRIC HEIGHT $\overline{GM}$ = 14.93 FT

FREE SURFACE (F.S.) = - FT

$\overline{GM}$ CORRECTED FOR (F.S.) = 14.93 FT

$\overline{GM}$ REQUIRED = ______ FT

MARGIN = ______ FT

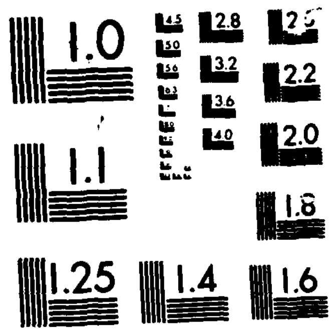
MOMENT TO HEEL 1° = ______ FT-LT

GLOBAL MARINE DEVELOPMENT INC.
KOLL CENTER NEWPORT
4100 MacArthur Boulevard
Newport Beach, California 92660

SYMBOLS
= S.W.
= F.W.
= DK CARGO
= OIL CARGO
= BULK CARGO
= DRY CARGO
= FO or DO

AD-A165 727 WEST COAST OCEAN CONSTRUCTION PLATFORM PRELIMINARY DESIGN STUDY VOLUME 2..(U) GLOBAL MARINE DEVELOPMENT INC NEWPORT BEACH CA JUL 78 GMDI-040072-001-VOL-2 4/6

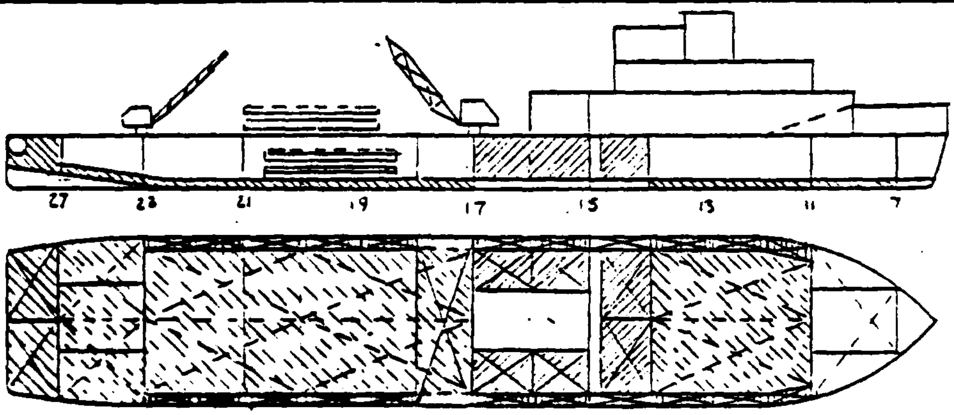
UNCLASSIFIED CHES/NAVFAC-FPO-1-78-9-PT-2 F/G 13/10 NL



MICROCOPY RESOLUTION TEST CHART

TRIM & STABILITY SUMMARY

CONDITION OF VESSEL Capacity Condition NO	DATE April 1978	PAGE 3
CARGO 100 % CONSUMABLES 100 % BALLAST 100 %	BY JCS	J/N 04072



REF LINE FOR V.C.G. Base Line REF LINE FOR L.C.G. FR 17/⌀/+ Fwd

SYMBOL	COMPARTMENT	CU FT TON	WEIGHT TONS	VCG ABV BL FT	MOMENT ABT BL FT TONS	LCG ABT ⌀ FT	MOMENT ABT ⌀ FT. TONS	VERT MOM OF F. S. FT. TONS
	Crew & Effects		6	20.0	120	72.0	432	
	Stores & Provisions		45	18.0	810	92.0	4140	
	Fuel		403		3707		- 3494	
	Potable Water		170		1529		7049	
	Wash Water		251		2258		4013	
	Deck Load		100	19.0	1900	-56.0	- 5600	
	Cargo Hold		100	8.0	800	-40.0	- 4000	
	Ballast		664		2532		- 27199	
	Lube Oil		2		19		- 151	
DEADWEIGHT			1741		13675		- 24810	
LIGHT SHIP			1349		19199		4501	
DISPLACEMENT			3890	10.64	32874	- 6.57	- 20309	

TRIM

DRAFT AT LCF = 10.94 FT
MOMENT TO ALTER TRIM 1" = 511.6 FT-LT
LCB (AFT, ~~FWD~~) OF ⌀ = 0.99 FT
LCG (AFT, ~~FWD~~) OF ⌀ = 6.57 FT
TRIMMING LEVEL = 5.58 FT
TRIM (BY STERN, ~~HEAD~~) = 2.81 FT
LCF (AFT, ~~FWD~~) OF ⌀ = 6.98 FT
DRAFT AT FP = 9.46 AP = 12.27

DRAFTS AT DRAFT MARKS
MEAN 10.87
FWD = AFT =

STABILITY

METACENTER ABOVE BL $\overline{KM}$ = 24.25 FT
CENTER OF GRAVITY ABV BL $\overline{KG}$ = 10.64 FT
METACENTRIC HEIGHT $\overline{GM}$ = 13.61 FT
FREE SURFACE (F.S.) = - FT
$\overline{GM}$ CORRECTED FOR (F.S.) = 13.61 FT
$\overline{GM}$ REQUIRED = FT
MARGIN = FT
MOMENT TO HEEL 1° = FT-LT

GLOBAL MARINE DEVELOPMENT INC.
KOLL CENTER NEWPORT
4100 MacArthur Boulevard
Newport Beach, California 92660

SYMBOLS: = S.W. = F.W. = DK CARGO = OIL CARGO = BULK CARGO = DRY CARGO = FO or DO

LIQUID LOADINGS

ESTIMATE OF WEIGHT FOR SHIPS, WORK SHEET
NAVSHIPS 9616A-2 (11-67)

YFNB CONVERSION

BUDGET BUREAU NO. 46-R281
REPORT-BUSHIPS-9281-4

DATE

PAGE

DESCRIPTION	WEIGHT (Tons)	CENTER OF GRAVITY ABOVE BASE	MOMENTS	REFERRED TO FRAME NO. 17 FWD	MOMENTS	AFT	MOMENTS	SLACK FREE SURFACE FT-LT *	MOMENTS		
Pot Water P/S 6115 CF 100%	169.86	9.0	1528.74	41.5	7049.19				240.74		
Wash Water No 1 P/S 4515 CF 100%	125.42	9.0	1128.78	8	1003.36				64.00		
No 2 P/S 4515 CF 100%	125.42	9.0	1128.78	24	3010.08				64.00		
	250.84		2257.56		4013.44						
Ballast No 1 P/S 5062 CF 100%	144.63	1.5	216.95	74.8	10818.32				6518.52	Do not	use slack
No 2 P/S 5644 CF 100%	161.26	1.5	241.89			24	3870.24		7111.11	Do not	use slack
No 3 P/S 5174 CF 100%	147.83	1.5	221.75			70	10348.10		6518.52	Do not	use slack
No 4 P/S 3352 CF 100%	95.77	5.0	478.86			104	9960.23				
Aft Peak 4003 CF 100%	114.37	12.0	1372.44			121	13838.77		266.67		
	663.86		2531.88				27199.02				
F.O. Tank No 1 P/S 6748 gal-95%	21.74	9.2	200.01	86	1869.64				1.54		
No 2 P/S 11520 gal-95%	37.11	9.2	341.41	72	2671.92				2.06		
No 3 P/S 13440 gal-95%	43.30	9.2	398.36	56	2424.80				2.06		
No 4 P/S 13440 gal-95%	43.30	9.2	398.36	24	1039.20				2.06		
No 5 P/S 13440 gal-95%	43.30	9.2	398.36	8	346.40				2.06		
No 6 P/S 13440 gal-95%	43.30	9.2	398.36			24	1039.20		2.06		
No 7 P/S 13440 gal-95%	43.30	9.2	398.36			40	1732.00		2.06		
No 8 P/S 13440 gal-95%	43.30	9.2	398.36			56	2424.80		2.06		
No 9 P/S 13440 gal-95%	43.30	9.2	398.36			72	3117.60		2.06		
No 10 P/S 8780 gal-95%	28.28	9.2	260.18			86	2432.08		1.54		
Day Tks (3) 1270 gal ea 95%	12.27	9.5	116.57			90	1104.30				
	402.50		3706.69				3493.72				
Lube Oil (3) 180 gal ea -95%	1.68	11.5	19.32			90	151.20				
TOTALS, POUNDS											
TONS											

COMPUTING BY

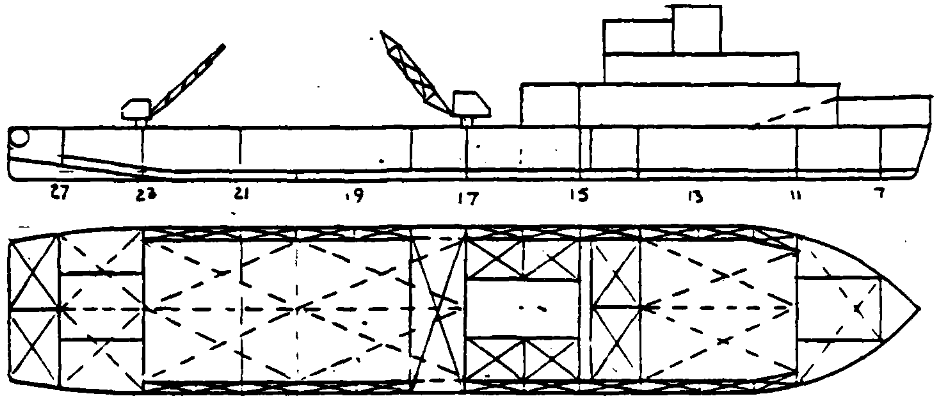
COMPUTING CHECKED

* Free surface figures are for each tank

TRIM & STABILITY SUMMARY

CONDITION OF VESSEL ______________________ NO ____ | DATE ________ | PAGE ________

CARGO ______ % CONSUMABLES ______ % BALLAST ______ % | BY ________ | J/N ________



REF LINE FOR V.C.G. ____________________ REF LINE FOR L.C.G. ____________________

SYMBOL	COMPARTMENT	CU FT TON	WEIGHT TONS	VCG ABV __ FT	MOMENT ABT __ FT TONS	LCG ABT __ FT	MOMENT ABT __ FT. TONS	VERT MOM OF F. S. FT. TONS
DEADWEIGHT								
LIGHT SHIP								
DISPLACEMENT								

TRIM

- DRAFT AT LCF = ________ FT
- MOMENT TO ALTER TRIM 1" = ________ FT-LT
- LCB (AFT, FWD) OF __ = ________ FT
- LCG (AFT, FWD) OF __ = ________ FT
- TRIMMING LEVEL = ________ FT
- TRIM (BY STERN, HEAD) = ________ FT
- LCF (AFT, FWD) OF __ = ________ FT
- DRAFT AT FP = ______ AP = ________

DRAFTS AT DRAFT MARKS

MEAN ________

FWD = ________ AFT = ________

STABILITY

- METACENTER ABOVE BL $\overline{KM}$ = ________ FT
- CENTER OF GRAVITY ABV BL $\overline{KG}$ = ________ FT
- METACENTRIC HEIGHT $\overline{GM}$ = ________ FT
- FREE SURFACE (F.S.) = ________ FT
- $\overline{GM}$ CORRECTED FOR (F.S.) = ________ FT
- $\overline{GM}$ REQUIRED = ________ FT
- MARGIN = ________ FT
- MOMENT TO HEEL 1° = ________ FT-LT

GLOBAL MARINE DEVELOPMENT INC.

KOLL CENTER NEWPORT
4100 MacArthur Boulevard
Newport Beach, California 92660

SYMBOLS

= FO or DO
= DRY CARGO
= BULK CARGO
= OIL CARGO
=
= F.W.
= S.W.

APPENDIX O

YFNB DYNAMIC MOTION AND RAO CURVES

PART I

YFNB SHIP MOTION ANALYSIS :

THE FOLLOWING DATA ARE INPUT INTO HANSEL PROGRAM :

L_{BP} = 260 FT

BEAM = 48 FT

DRAFT = 8.67 FT

ROLL RADIUS OF GYRATION = 19.20 FT

PITH " " " = 72.80 FT

YAW " " " = 83.30 FT

VCG = 11.69 FT ABOVE B.L.

THE FOLLOWING ARE CALCULATED BY THE PROGRAM :

DISPLACEMENT = 2707 TONS

$\overline{KM}$ = 25.53 FT

$\overline{GM}$ = 13.84 FT

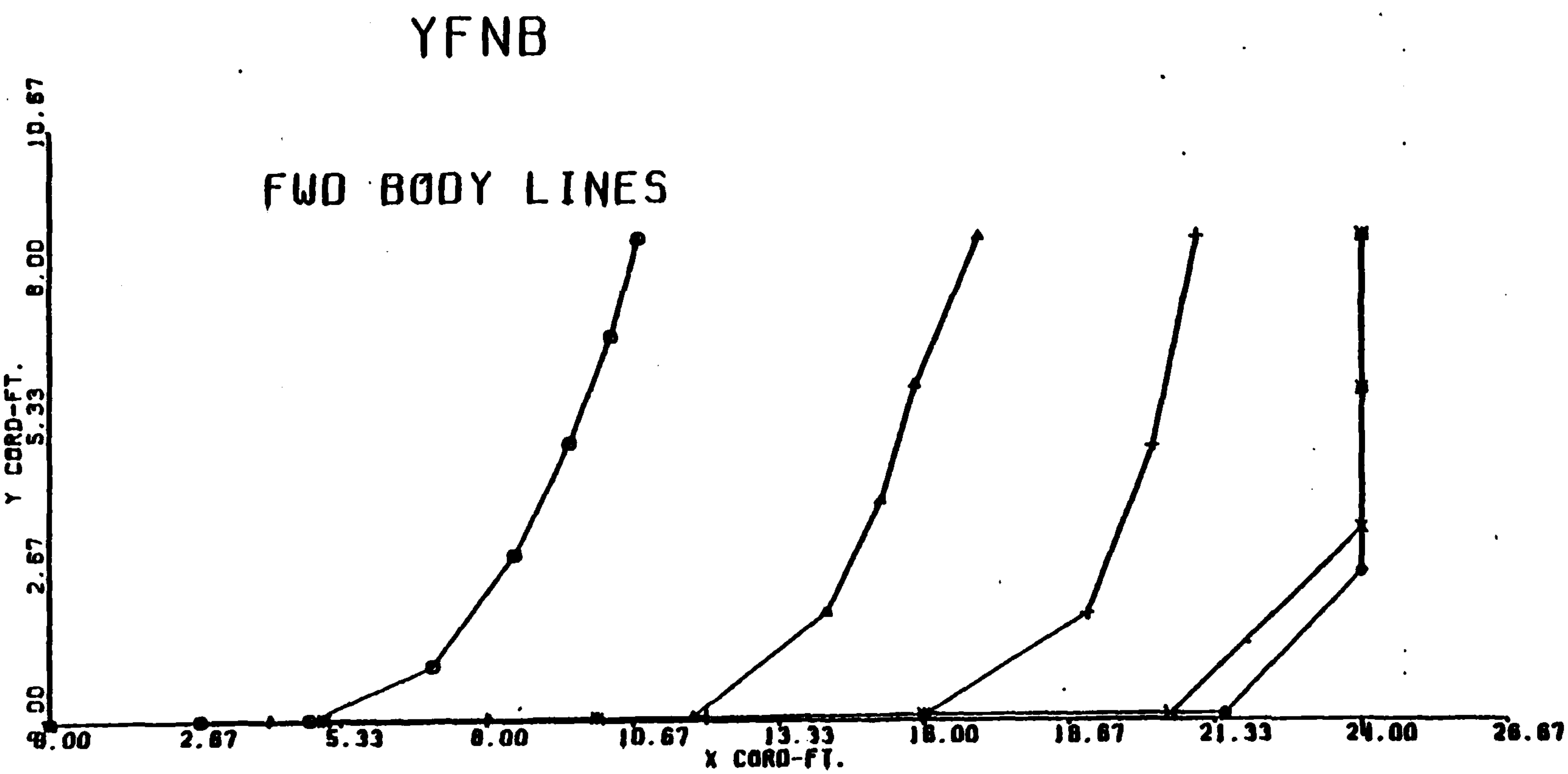
FROM TRIM AND STABILITY

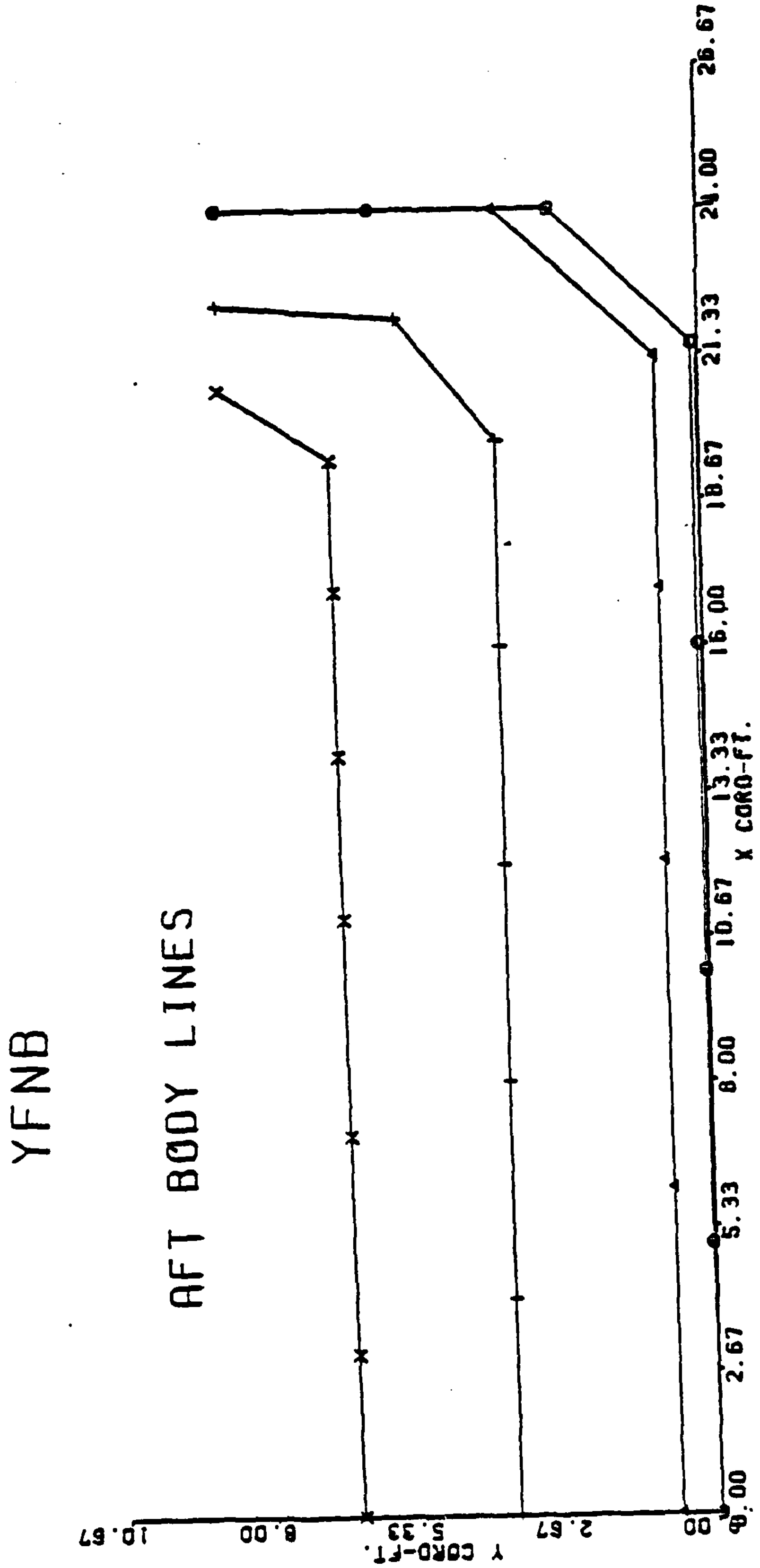
AT 8.67 FT DRAFT

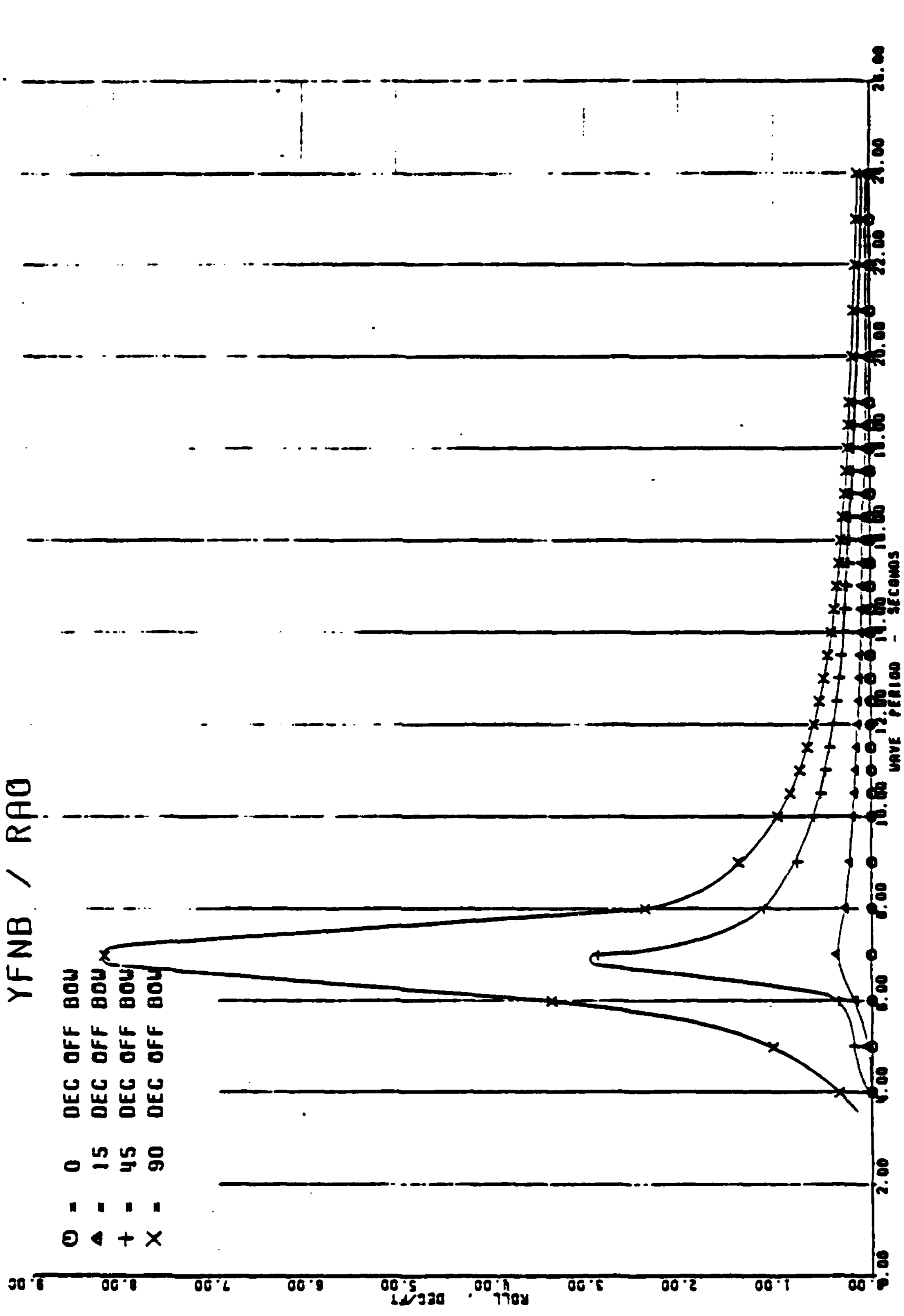
DISPLACEMENT = 2401 TONS

$\overline{KM}$ = 27.80 FT

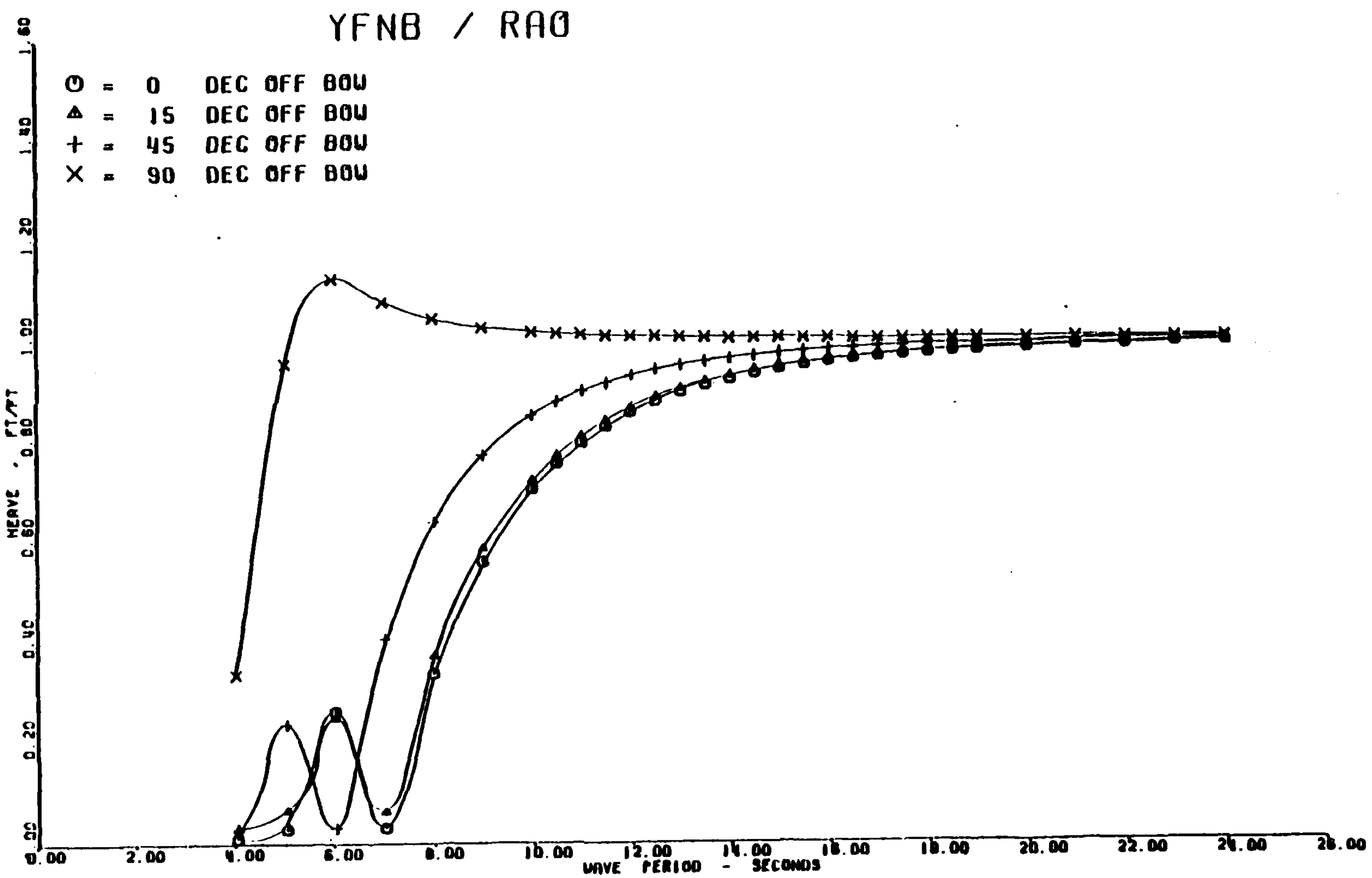
GM = 16.12 FT


YFNB
FWD BODY LINES
10.67
8.00
5.33
2.67
.00
Y CORD-FT.
0.00
2.67
5.33
8.00
10.67
13.33
16.00
18.67
21.33
24.00
26.67
X CORD-FT.

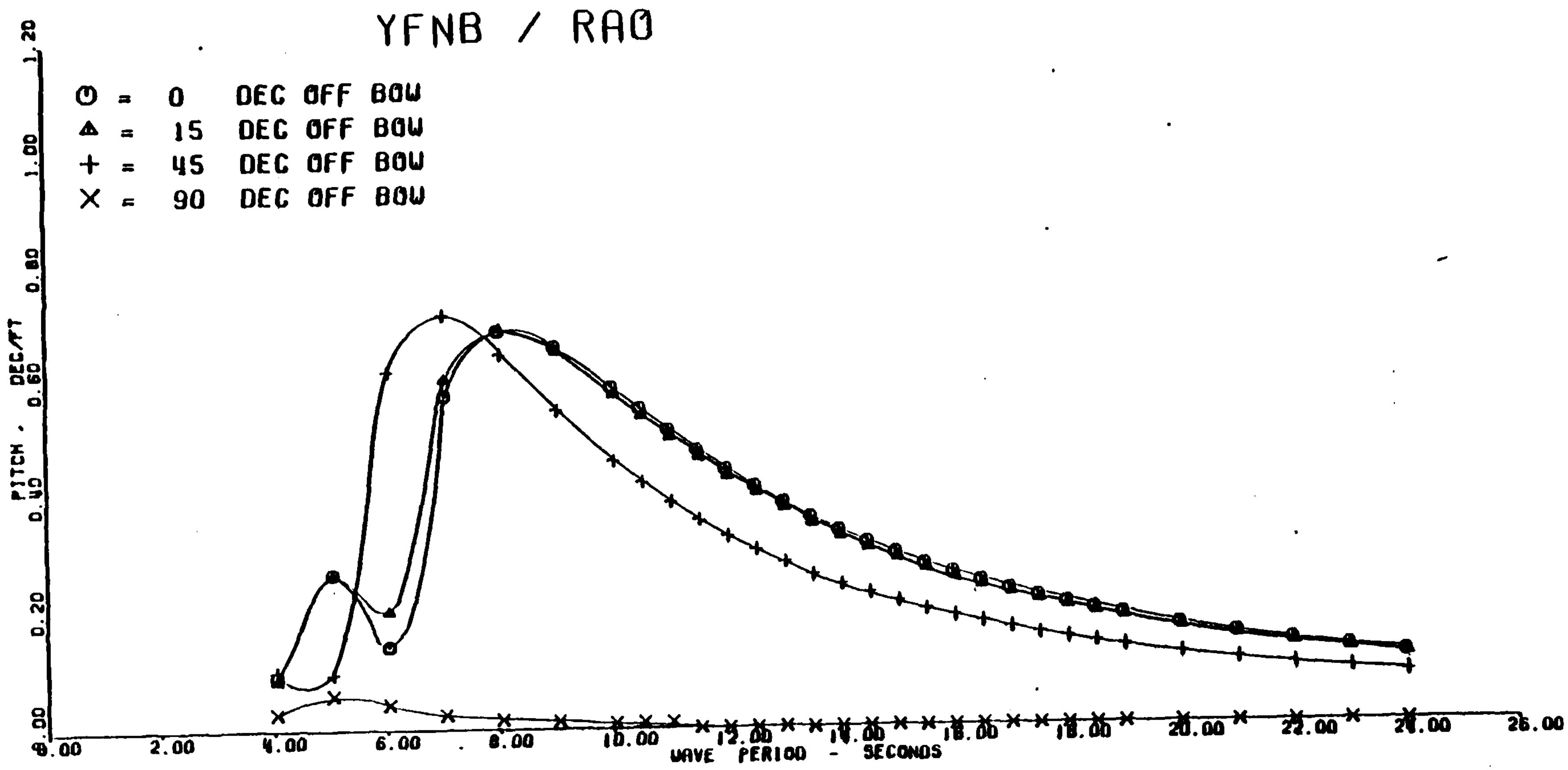

YFNB
AFT BODY LINES
0.00
2.67
5.33
8.00
10.67
13.33
16.00
18.67
21.33
24.00
26.67
X CORD-FT.
.00
2.67
5.33
8.00
10.67
Y CORD-FT.

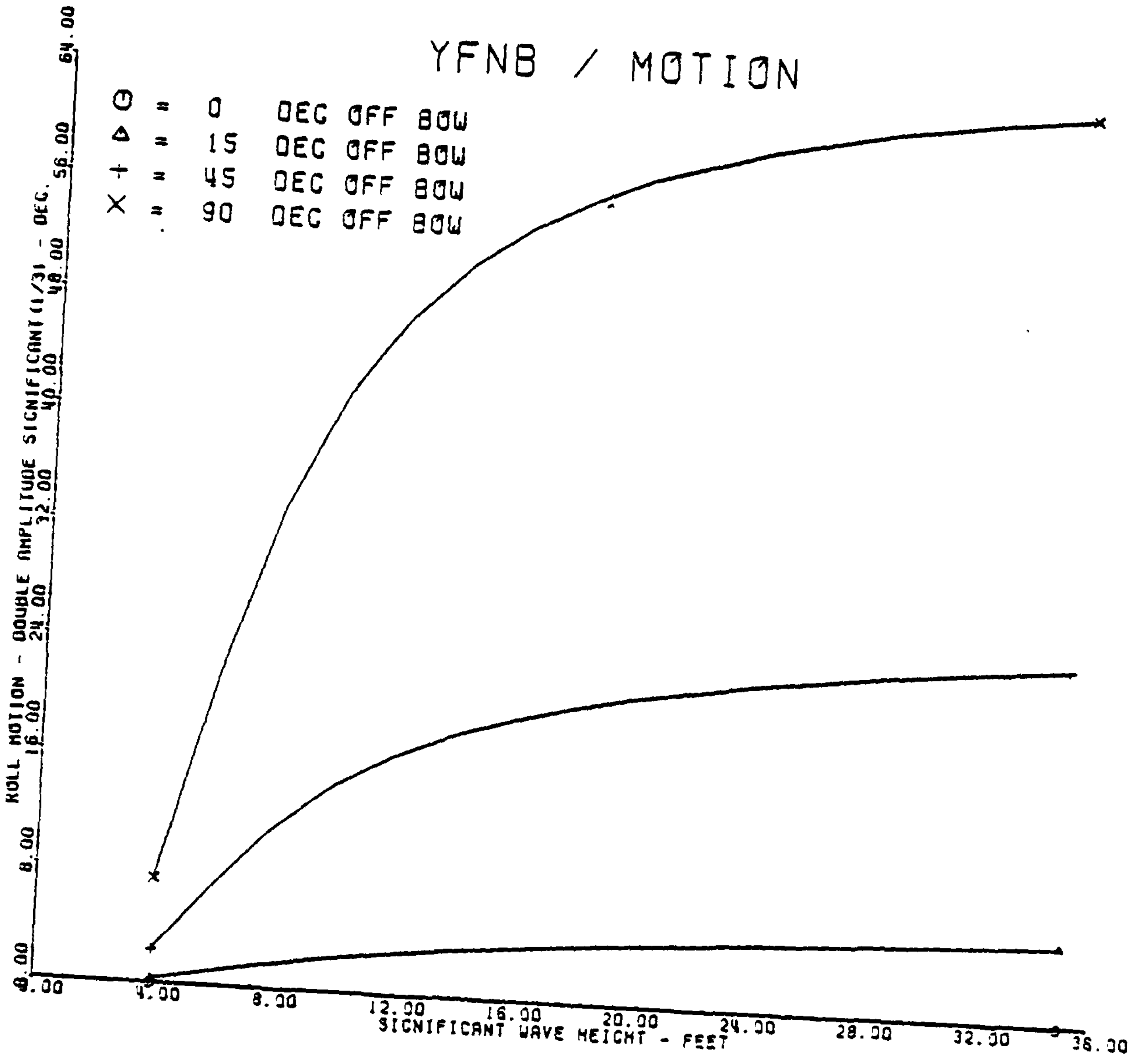


YFNB / RAO
Θ = 0 DEG OFF BOW
▲ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
ROLL , DEG/FT
WAVE PERIOD - SECONDS

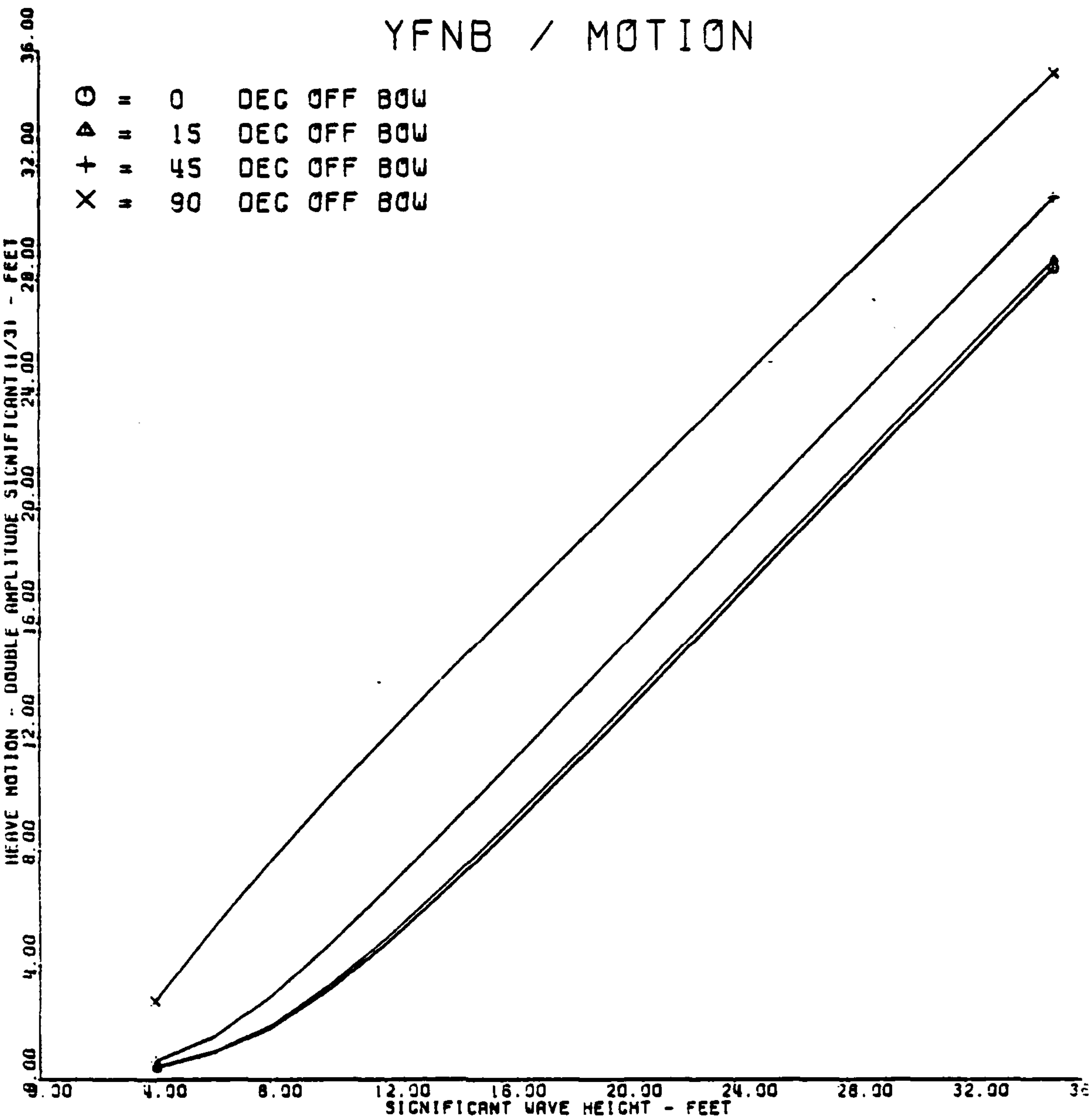


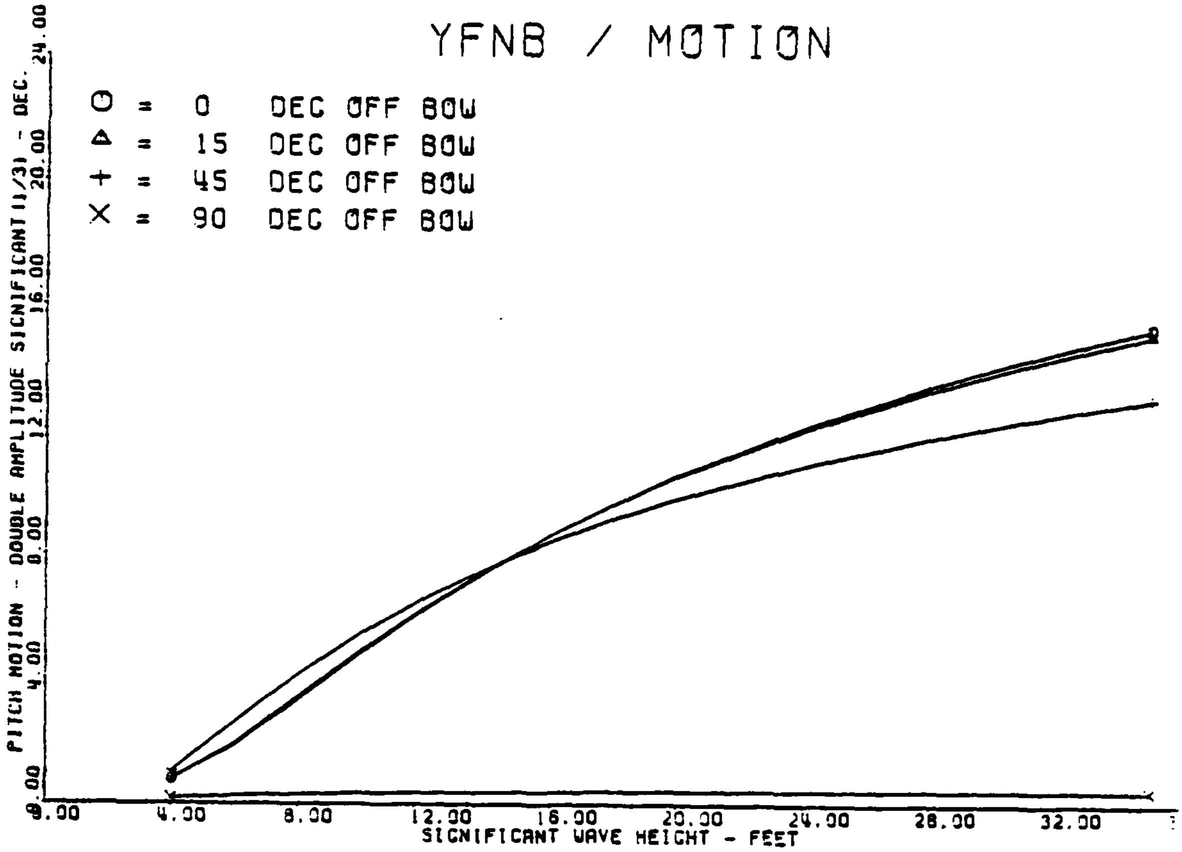
YFNB / RAO
O = 0 DEC OFF BOW
Δ = 15 DEC OFF BOW
+ = 45 DEC OFF BOW
X = 90 DEC OFF BOW
HEAVE , FT/FT
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
26.00
WAVE PERIOD - SECONDS

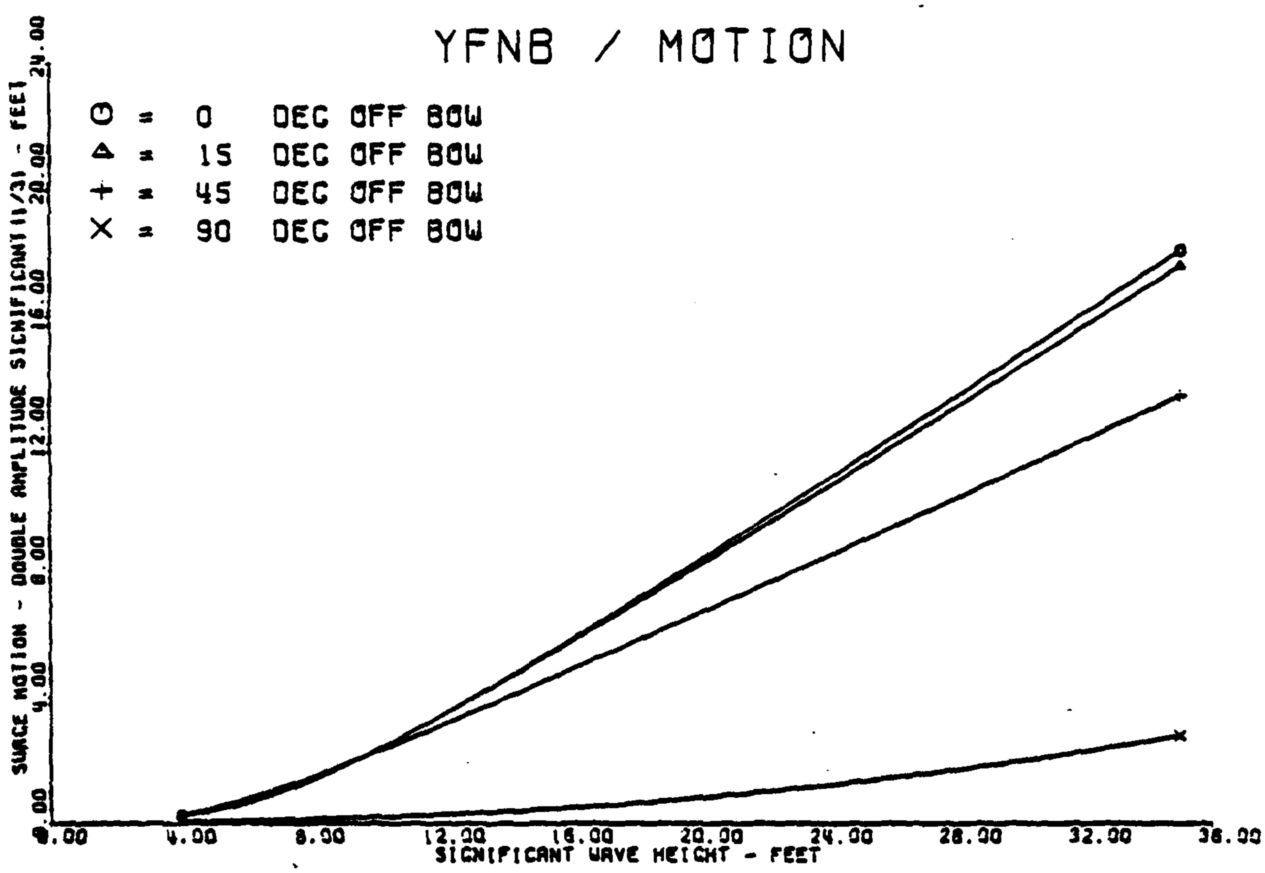

YFNB / RAO
O = 0 DEG OFF BOW
Δ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
PITCH , DEG/FT
0.00
0.20
0.40
0.60
0.80
1.00
1.20
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
26.00
WAVE PERIOD - SECONDS

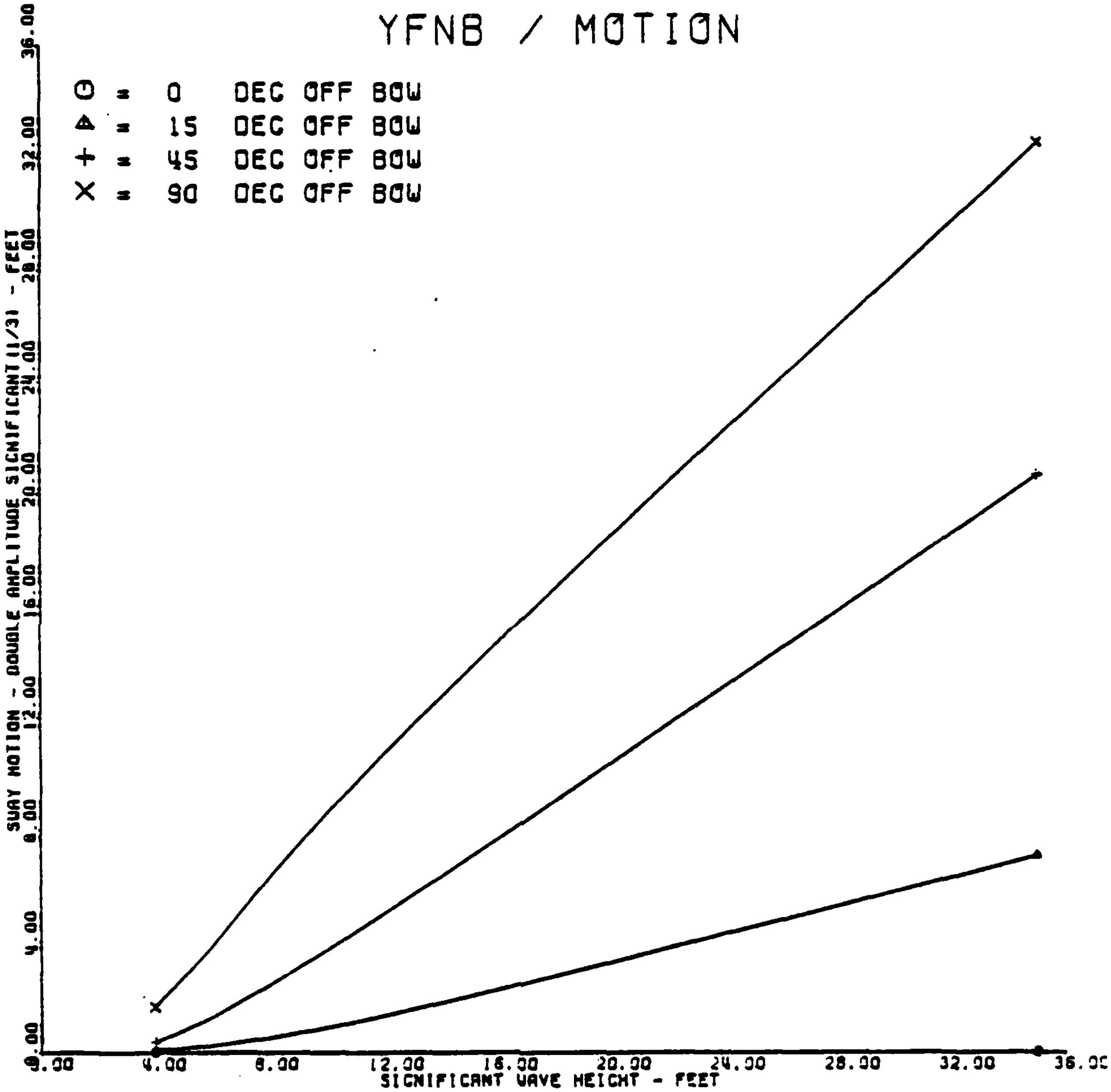


YFNB / MOTION
⊙ = 0 DEG OFF BOW
△ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
× = 90 DEG OFF BOW
ROLL MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - DEG.
SIGNIFICANT WAVE HEIGHT - FEET

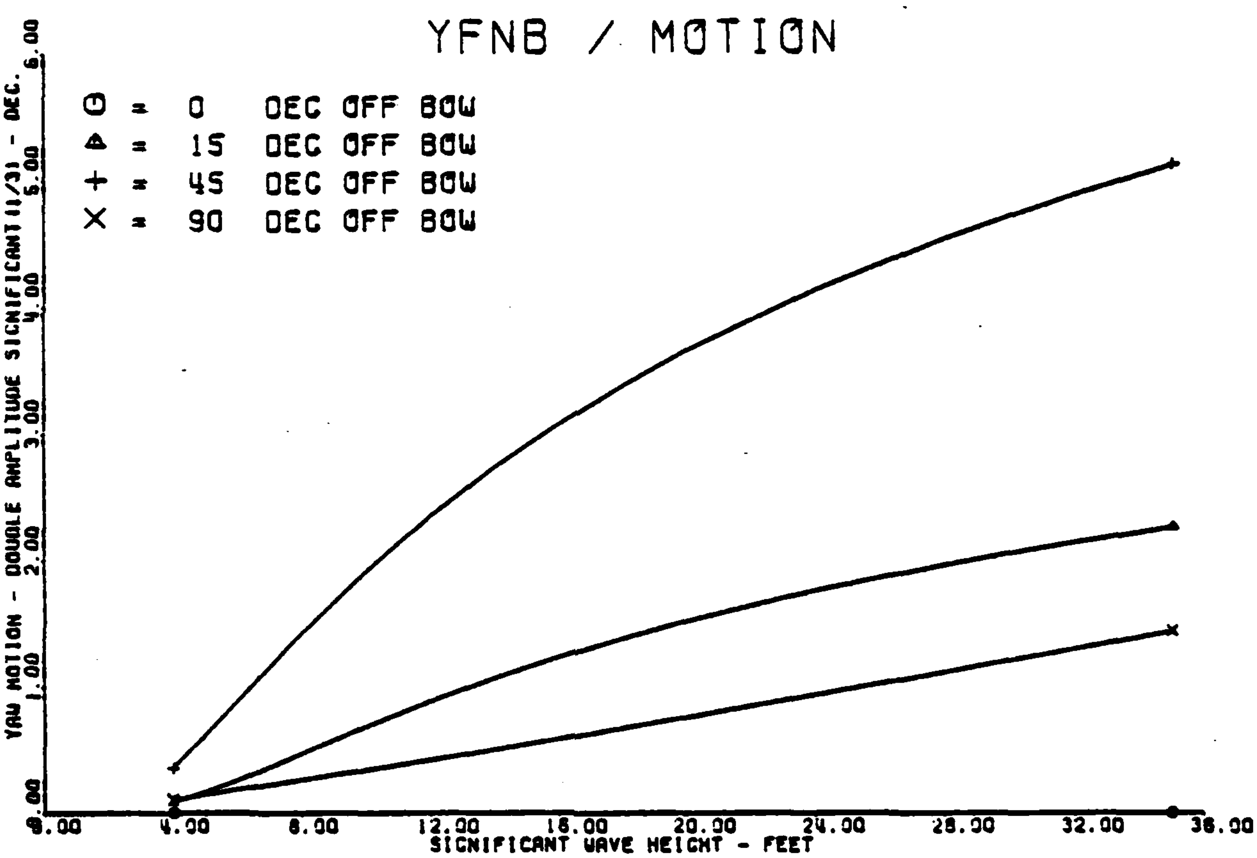

YFNB / MOTION
⊙ = 0 DEG OFF BOW
△ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
HEAVE MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - FEET
SIGNIFICANT WAVE HEIGHT - FEET
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00


YFNB / MOTION
O = 0 DEG OFF BOW
Δ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
PITCH MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - DEG.
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
SIGNIFICANT WAVE HEIGHT - FEET


YFNB / MOTION
O = 0 DEG OFF BOW
Δ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
SURGE MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - FEET
SIGNIFICANT WAVE HEIGHT - FEET
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00



YFNB / MOTION
O = 0 DEG OFF BOW
Δ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
SWAY MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - FEET
SIGNIFICANT WAVE HEIGHT - FEET
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00


YFNB / MOTION
⊙ = 0 DEG OFF BOW
△ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
YAW MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - DEG.
.00
1.00
2.00
3.00
4.00
5.00
6.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00
SIGNIFICANT WAVE HEIGHT - FEET

YOUSEF ALINAGHIAN

5/8/78

YFNB - SHIP MOTION - ROLL PREDICTION WITH BILGE KEEL

JOB NO. 04072-D10000

COMPUTER JOB NO. *016*YA 4072 X10000

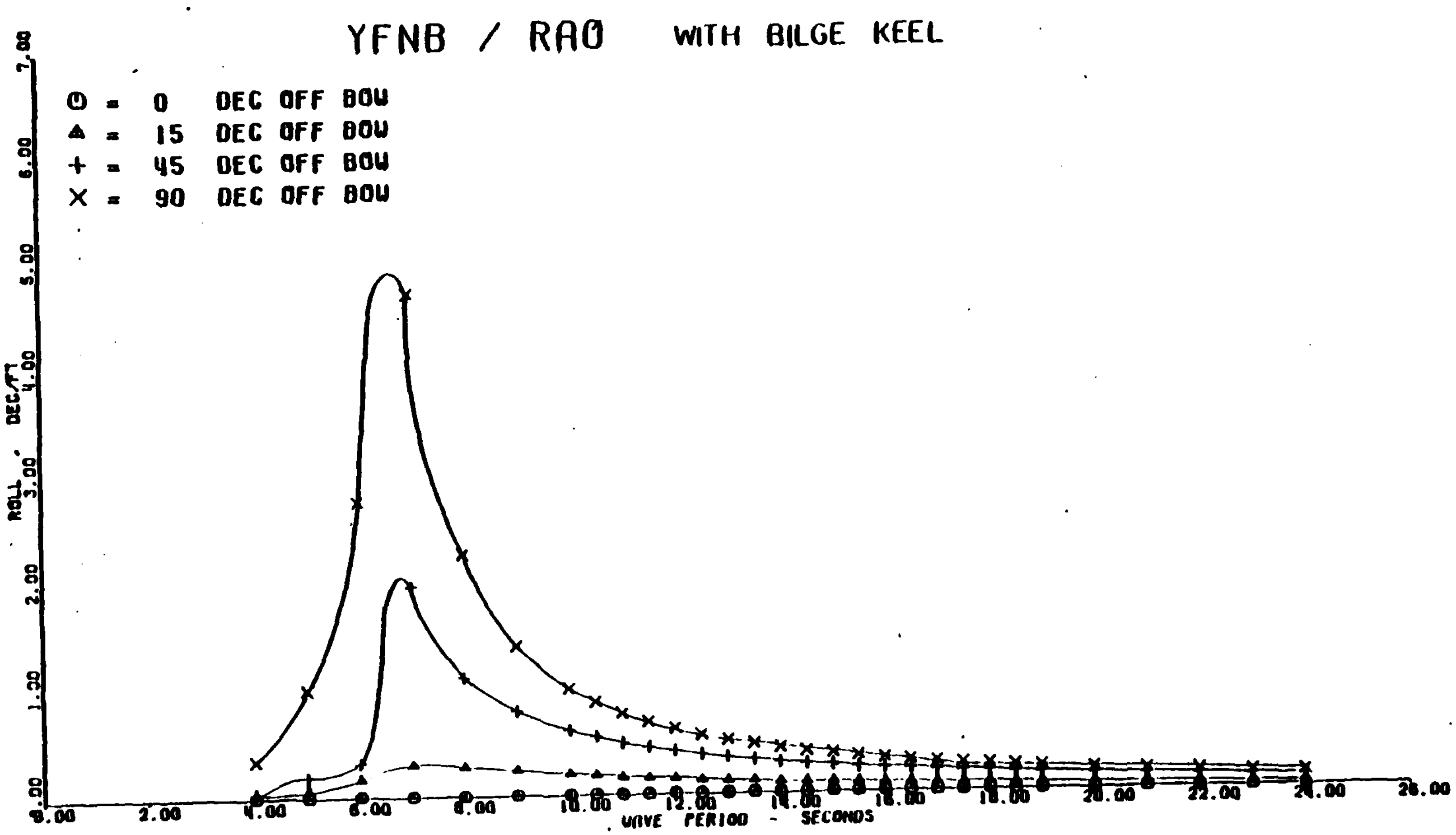
TOTAL MAN HRS : 7 hrs

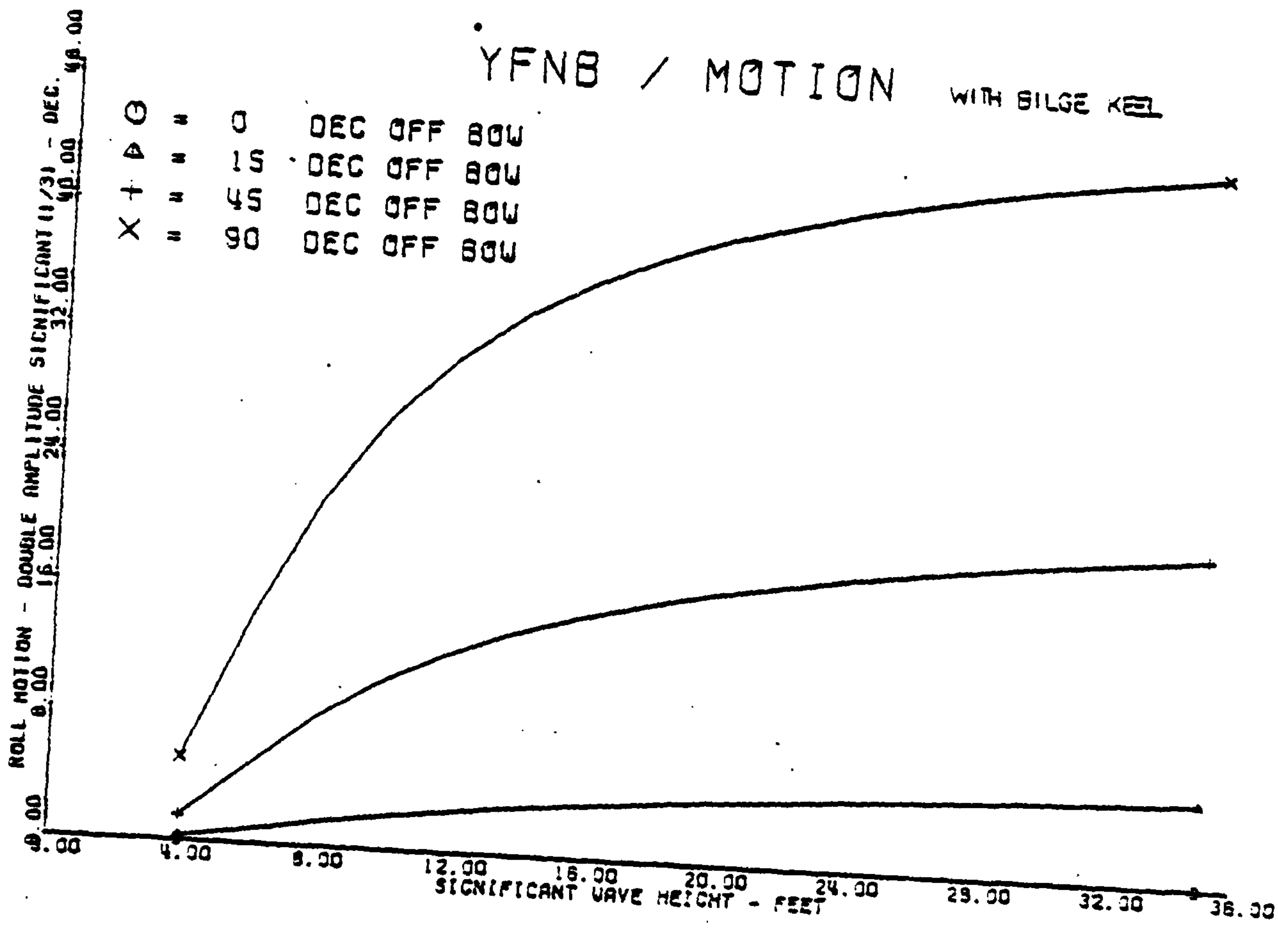
TOTAL COMPUTER CHARGE : $ 93.33

NOTE: BILGE KEEL STARTS FROM FRAME 12 AND ENDS AT FRAME 21

TOTAL LENGTH OF BILGE KEEL = 144 FT

WIDTH OF THE BILGE KEEL = 18 IN.


YFNB / RAO WITH BILGE KEEL
O = 0 DEG OFF BOW
▲ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
ROLL , DEG/FT
WAVE PERIOD - SECONDS
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
26.00


YFNB / MOTION WITH BILGE KEEL
⊙ = 0 DEG OFF BOW
△ = 15 DEG OFF BOW
+ = 45 DEG OFF BOW
X = 90 DEG OFF BOW
ROLL MOTION - DOUBLE AMPLITUDE SIGNIFICANT(1/3) - DEG.
0.00
8.00
16.00
24.00
32.00
40.00
48.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
36.00
SIGNIFICANT WAVE HEIGHT - FEET

APPENDIX P

YFNB PASSIVE ANTI-ROLL TANK CALCULATIONS

4-8 04072-010000

1

APR 1978 PASSIVE ANTI-ROLL TANKS / NAVFAC WCOCP

REFERENCE: US NAVY DESIGN DATA SHEET
DDS 9290-4 DATED 1 SEPTEMBER 1962

PRELIMINARY DESIGN (9290-4-b)

1. GM = 14.93 FT (FROM FULL LOAD CONDITION TRIM & STABILITY SHEETS)

2. B = 48 FT
FULL DECK HEIGHT = 12 FT

l_t = 16 FT (NOTE 18% B = 8.64 FT & NOT LONG ENOUGH)

T = 7 SECONDS (FROM HANSEL PROGRAM COMPUTER PREDICTION)

$$\omega_s = \frac{2\pi}{T} = 0.90$$

$$(r_s)^2 = \frac{g}{2\pi^2}\left(\frac{T^2}{B}\right) = 1.66$$

EQ. (3) $(r_t)^2 = 0.826\,(r_s)^2 = 1.37$

$$AR = \frac{h}{B} = \frac{6}{48} = 0.125$$

FROM FIG. 2 USE RECTANGULAR TANK

$$\gamma = \frac{b_n}{B} = 0.6 \text{ (ASSUMED INITIAL VALUE)}$$

$\therefore$ b_n = 28.8 FT distance between nozzles

wt. of active liquid ($\frac{1}{2}$ to $1\frac{1}{2}$% Δ)

Δ = 2522 L.T.

$12.61 \leq W_z \leq 37.83$

$$W_z = \frac{B^3 R \, (1-\gamma) \, C_W}{\text{SPEC VOL}} \qquad \text{EQ. (12)}$$

SPECFIC VOL = 36 CF/LT

$$C_W = \frac{l_t}{B} = \frac{16}{48} = 0.33$$

$$= \frac{B^3\left(\frac{h}{B}\right)\left(1-\frac{b_n}{B}\right)\left(\frac{l_t}{B}\right)}{\text{SPEC VOL}} = \frac{h \, l_t \, (B-b_n)}{\text{SPEC VOL}}$$

$$= \frac{6\,(16)\,(48-28.8)}{36} =$$

= 51.2 L.T. MORE THAN $1\frac{1}{2}$%

REDUCING h to 5 FT

TRY → W_z = 42.67 LT. OR 1.7%

$$W_t = \frac{48\,(16)\,5}{36} = 106.67 \text{ LT} = 4.2\%$$

HIGH BUT WILL TRY

EQ(4) K_s = Moment to heel 1°

= (0.0175) Δ GM -

= 0.0175 (2522) 14.93

= 658.9 FT-LT

APR 78 PASSIVE ANTI-ROLL TANKS

EQ (14)

$$K_t = (0.0175)\ \frac{B^4}{16}\ \frac{(1-\gamma^2)(1+\gamma)\ C_W}{\text{SPECIFIC VOL}}$$

$$= (0.0175)\ \frac{(48)^4}{16}\ \frac{(1-.6^2)(1+.6)\ 16/48}{36}$$

$$= (0.0175)\ \frac{(48)^3}{36}\ (.64)(1.6)$$

$$= 55.05 \text{ FT-LT}$$

$$\frac{K_t}{K_s} = \frac{55.05}{658.9} = 8.4\%$$

THIS VALUE SHOULD BE AT 12% WHERE AS ACTIVE LIQUID WEIGHT SHOULD BE 1½% OR LESS

WITH THIS VALUE OF $\gamma = 0.6$ IN ABOVE $(1-\gamma^2)(1+\gamma) = 1.024$

WHICH IS A MAXIMUM OF 1.185 @ $\gamma = 0.35$

WHERE $K_t = 63.71$

& $K_t/K_s = 9.7\%$ ONLY

USING SALT WATER $K_t/K_s = 9.9\%$

THE ONLY FEASIBLE WAY OF GETTING THIS RATIO UP TO THE DESIRED 12% IS

1. INCREASE LENGTH OF THE TANK TO ABOUT 20 FEET

2. DECREASE GM (K_s = 458 FT-LTS) TO ABOUT 10.4 FEET

JCS

04072
4

APR 1978 PASSIVE ANTI-ROLL TANKS

METHOD 1 ABOVE TAKES UP TOO MUCH ROOM

METHOD 2 WOULD INVOLVE ADDING A GREAT DEAL OF HIGH WEIGHT WHICH WOULD ALSO BE UNACCEPTABLE

APPENDIX Q

CLASS C ESTIMATES FOR YFNB AND

EX-DRILLSHIP

J. Kane

5-10-78 NAVFAC (FPO-1) YFNB - HULL CONVERSION.

SUMMARY SHEET

SHIPYARD CONSTRUCTION (INCL'S EQUIP'T PURCHASES)	-	$ 8,160,000
SHIPYARD ENGINEER	=	$ 300,000
G.M.D.I. ENGINEERING	=	350,000
" PROGRAM MANAGEMENT	-	94,000
" CONST'N INSPECTION	=	150,000
SHIP MOVEMENT COSTS	-	50,000
TOTAL EST'D COST	-	$ 9,104,000
SHIPS AQUISITION	=	NOT INCLUDED
G.M.D.I ADMINISTRATION HANDLING CHARGE	=	$ 360,000
GRAND TOTAL	=	$ 9,464,000

NOTE: ALL LABOR, MATERIAL & EQUIPMENT COSTS ARE BASED ON PRICES AS OF MAY 1978, WITH NO ESCALATION INCLUDED.

J. Kane.

04072-010000

4-28-79.

ESTIMATE SHEET
NAVFAC (F.P.O-1) - Y.F.N.B. HULL CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
1) REMOVALS:					
FORWARD DERRICK, PLATFORM & FOUNDATIONS	ONE	-	-	80	50.
ROLLER GUIDES, CONTROLS, ETC	LOT.	-	-	120	100
WATER TIGHT HATCH & COVER.	ONE			40	20.
VENT TRUNKS.	6.	8	5	48	30
VENT'N & EXH. DUCTS P/S.	2 CUNS.	96	50	192	100.
FIRE PIPING SYSTEM. P/S		96	50	192	100
SAFETY NET & SUPPORTS P/S	2	72	50	144	100.
STL. STRUCTURE FRAME # 16 AFT. 114 S. TONS (INCL. STANCHIONS)	LOT	20/T.	$15/T	2280	1770.
FIRE PUMPS P/S. (W/FDNS.)	2	24	20	48	40
D.O. TANKS P/S. (W/FDNS)	2	24	200	48	400
MOTOR GEN. SET (PORT. SIDE)	ONE	24	20	24	20
290 K.W. GENERATOR SET (PORT SIDE)	ONE	48	50	48	50
D.O. TANK (P. SIDE)	ONE	24	200	24	200
AIR TANK & FDNS.	ONE	16	20	16	20
75 K.W. GENERATOR SETS	2.	32	20.	64	40
EXHAUST DUCTING	LOT.	96.	50	96	50
AIR COMPRESSORS	2	24.	20	48	40
MISC EQUIPT, STL. WORK & VENT DUCTING	LOT	-	-	400	200
AIR TANKS PLATFORMS ETC	LOT.	-	-	800	500
MISC. PIPING	LOT	-	-	800	500
MISC ELEC'L CABLE, WIREWAYS, SWITCH-BOARDS & CONTROLS	LOT	-	-	1000	500.
CLEAN OUT SPACES BELOW FOC'SLE DK FRAME # 16 FORW'D TO FRAME Nº 12.				120	200
CLEAN OUT SPACES, REMOVE EQUIP'T STRIP & REMOVE JOINER BHDS	16 SPACES	48	50	768	800
REMOVAL ELEC'L CABLE, CABLEWAYS, FITTINGS, ETC.	LOT	-	-	320	500.

J. Kane

2

ESTIMATE SHEET

5-6-78. NAVFAC (F.P.O-1) - Y.F.N.B. HULL CONVERSION

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
Remove All Pipe Systems & Fittings.	-			320	500
Hold Area					
Dissconnect & Remove The Following					
Gen. Sets, With Fdns.	2.	48	50	96	100
Fire Pump, With Fdns	1.	24	20	24	20.
Switchboard	1	100	50	100	50
Bins.	Lot	48	50	48	50
Workbench	One	16	-	16	-
Lube Oil Tank	One	48	250	48	250
Evaporator.	One	24	20	24	20
CO_2 System.	Lot	48	50	48	50
Misc Equipt	Lot.	-	-	400	500.
Ventilation System.	Lot	240	200	240	200
Piping Systems.	Lot	240	200	240	200
Electrical Systems.	Lot	240	200	240	200
Buoyancy Drum Stowage Area	Lot	800	500	800	500
Fwd. Pump Room, Stores & Misc. Spaces	Lot	-	-	800	1000
Remove Bhd At Fr 20					
Approx Wgt = 11,850 lbs = 5.925 S.Tons		20/T.	15/T	119	90.
Remove Dk & Framing In Way Of New Anti Roll Tank, Well & New Void Space					
Approx Wgt = 35,000 lbs = 17.5 S.T.		20/T	15/T.	350	2625
Run Out, Clean And Inspect Chain In Fore & Aft Chain Lockers				400	1,000.
Remove Aft Guide Ass'y	-	-	-	240	500
Remove Shell In Way Of New Center Well & Install New Stl Bhd Between Hold Dk & Shell.					
Approx Wgt Removed Steel = 10.5 S.T.		20/T	15/T.	210	160.
Approx Wgt New Steel Bhd's = 9.0 L.T. @ $5560/L.T.				-	50,040

J. Kane

ESTIMATE SHEET

NAVFAC (F.P. O-1) Y.F.N.3 HULL CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
REHABILITATION					
CLEAN & PAINT HULL (EXTERIOR)					
SURFACE AREA = 19,000 SQ FT. APPROX.					
BLASTING.	19,000□'	1.5MH/100□'	$10/100□'	285	1900
PAINTING (3 COATS) 100□'/GAL.	570	2.5MH/GAL	$15/GAL	1425	8550
(PAINT COST INCL'S THINNERS AND OTHER MAT'LS)					
OPEN UP, GAS FREE & CLEAN VOID SPACES P/S	20	40	25	800	500
OPEN UP, GAS FREE & CLEAN FUEL OIL TANKS P/S.	2	80	1000	160	2000
OPEN UP & CLEAN F.W. TANKS P/S	2	40	25	80	50
OPEN UP & CLEAN DOUBLE BOTTOM SPACES.	20	48	25	960	500
FAB & INSTALL BHD AT FR# 21. APPROX WGT = 5.3 L.TONS @ $5,560/L.T				-	29,468
FAB & INSTALL BHD AT FR# 18 APPROX WGT = 5.3 L.TONS @ $5,560/L.T.				-	29,468
FAB & INSTALL WASH WATER TNKS FR# 17 TO FR# 15 P/S STL WGT = APPROX 22 L.TONS @ $5560/L.TON.	4			-	122,320
FAB & INSTALL VOID SPACE FORW'D FR #15. STL = 5.3 L.TONS @ $5560/L.TON.				-	29,468
CLOSE UP VOID SPACE TRANSVERSE BHD'S 26 × 350 lbs = 4.0 L.T. @ $5560/L.TON					22,240
FAB & INSTALL ℄ BHD FOR POTABLE WATER TANKS. STL WGT APPROX 4900 lbs = 2.2 L.T. @ 5560/L.T.					12,232

J Kane

ESTIMATE SHEET

5-7-78. NAVFAC (F.P.O-1) YFNB HULL CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
REHABILITATION (CONTD)						
FABRICAT & INSTALL HINGED PLUG IN NEW CENTERWELL.						
STL. WGT. = APPROX 40,000 lbs 16 LT. @ $5560/L.T.					88,960	
HARDWARE SUCH AS SHACKLES, WIRE ROPE, STOPS, PADS ETC.				500	2,000	
FAB & INSTALL BOOBY HATCHES P/S	2.	200	500	400	1000	
FAB & INSTALL FLUSH W/T HATCH 12'-0" × 8'-0" ON MN. DK.	ONE	7.5□'	-	720	2,740	
FAB & INSTALL FLUSH W/T HATCH 22'-0" × 22'-0" ON MN. DK.	ONE.	7.5/□'	-	3630	13,800	
FAB & INSTALL FLUSH HATCH COVER (SPLIT) OVER NEW CENTER WELL - 32'-0" × 16'-0"		7.5/□'	-	3840	14,600	
CUT DK & AFT BHD AT 01 LEVEL AND INSTALL ROLLER CURTAIN DOOR.						
DOOR OPENING = 27'-0" WIDE × 29'-0" LG.						
CUT OPENING		-	-	48	25	
PURCHASE & INSTALL DOOR COMPLETE		-	-	-	150,000	(20,000)
FAB & INSTALL NEW HOUSE STRUCTURE APPROX WGT FOR EXTERIOR BHDS & DKS = 51.84 L.T. @ 5560					286,785	
FAB & INSTALL NEW INTERIOR STL BHDS ALL DKS. APPROX WGT. = 72 L.TONS @ $5560/L.TON.					400,320	

J. Kane

5-8-78.

ESTIMATE SHEET
NAVFAC (RP 0-1) Y.F.N. 3. HULL CONVERSION

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
REHABILITATION & CONT'D						
QUARTERS OUTFITTING				INCL'D IN MAT'L DOLLAR		
SECOND DECK:						
SIX - 4 MAN STATEROOMS; TWO - 2 MAN STATEROOMS; HEAD & SHOWER FACILITIES & LAUNDRY ROOM.						
MAIN DECK.						
TWO - 2 MAN STATEROOMS; ONE - 4 MAN STATEROOM, HOSPITAL; LOUNGE & LIBRARY MESSROOM GALLEY, SHOWER & TOILET FACILITIES.						
01 LEVEL.						
TWO - 4 MAN STATEROOMS; THREE - 2 MAN STATEROOMS, TWO - ONE MAN STATEROOMS; TWO OFFICES; SHOWER & TOILET FACILITIES						
TOTAL PERSONNEL	52	-	17,500		910,000	
THIS FIGURE INCLUDES COMPLETE OUTFITTING OF QUARTERS, INCLUDING H.V.A.C., ELECTRICAL, PLUMBING, ETC.						
WELD SHOP; MACH. SHOP; ELECX & ELEC'L SHOP, & PHOTO LAB. EQUIP'T.						
WELDING M/C.	ONE	16	1500	16	1500	1200
LATHE	ONE	40	14000	40	14000	12000
DRILL PRESS	ONE	16	2025	16	2025	1800
WORK BENCHES	3	16	500	48	1500	1200
TEST EQUIPMENT	LOT	-	-	96	5,000	4000
MISC. TOOLS & FITTINGS	LOT.	-	-	100	2000	2000
PEDESTAL GRINDER	ONE	16	1150	16	1150	1000
PHOTO LAB EQUIP'T	-	-	-	-	30,000	30000
INCLINED LADDERS WITH HANDRAILS						
14 LADDERS APPROX AVG LGTH 8-6"		48	60	672	840	

J Kane

6.

ESTIMATE SHEET

5 - 8 - 78. NAVFAC (F.P.O-1) YFNB - HULL CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
REHABILITATION & MODIFICATIONS (CONT'D)					
PIPING SYSTEMS :-					
SALT WATER COOLING SYS'M.					
PIPE 4" DIA X.S. GALV.	200'	1.40	$10.39	280	2078
" 2" " " "	150'	1.15	$3.65	173.	548.
" 1½" " " "	150'	1.15.	$1.95	173.	293.
" ½" " " "	50'	.75	.75	38	38.
VALVES 4" DIA	14	2.0.	350.00	28	4900
" 2" "	4	1.0	108.00	4	432.
" 1½" "	4	1.0	68.00	4	272
" ½" "	4	.5	15.00	2.	60
FLANGES 4" DIA	28	2.7	28.00	76	784
" 2" DIA	8	1.5	16.00	12	128
" 1½" "	8	1.3.	13.50	10	108
TEES (VAR SIZES)	10	2.8	30.00	28	300
ELLS (" ")	12.	2.3.	19.00	28	228
MISC FITTINGS, REDUCERS BOLTS, HANGERS BOLTS, PRESS GAUGES, ETC.	LOT.	—	—	200	1000.
SEA CHEST (STRAINERS).	ONE	48	2000	48	2000
OVERBOARD DISCH.	ONE.	48	250	48	250
DK & BHD PENETRATIONS	12.	8	10	96	120
FIREMAIN SYSTEM.					
PIPE 4" DIA XS GALV	500'	1.4	10.39	700	5195
" 2½" " " "	400'	1.15	4.40	460	1760
" 1½" " " "	150'	1.15	1.95	173.	293
VALVES. 4" DIA	8.	2	250.00	16	2000
" 2½" "	5	1.25	302.00	6.	1510
" 1½" "	3.	1.0	60.87	3	183
"Y" VALVES FOR SHORE CONN.	2.	2.0	400.00	4	800
FLANGES 4" DIA	16	2.7	28.00	43.	448
" 2½" "	10	1.7	19.50	17	195
" 1½" "	6.	1.3.	13.50	8	81
SEA CHEST'S (STRAINERS)	3	48	2000	144	6000
TEES, ELLS & MISC. FITTINGS.	LOT.	-	-	400	3000
FIRE STATIONS (INCL HOSE, ETC) 2½"	5	48	250	240	1250
" " " 1½"	5	48	215	240	1075
DK & BHD PENETRATIONS.	18.	8	10	144	180

J. Kane

5-8-78.

ESTIMATE SHEET

NAVFAC (FPO-1) YFNB - HULL CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
REHABILITATION & MODIFICATION (CONT'D)					
COMPRESSED AIR SYSTEM.					
PIPING 2½" DIA STD GALV	300'	1.15	2^{20}	345	660
" 1½" " " "	100'	1.15	1^{15}	115	115
" ¾" " " "	100'	.75	55¢	75	55
VALVES. 2½" DIA	5	1.25	220^{00}	6	1100
" 1½" "	4	1.00	65^{00}	4	260
" ¾" "	7	.5	42^{00}	4	294
FLGS 2½" DIA.	10.	1.7.	18^{00}.	17	180.
TEES, ELLS & MISC FITTINGS	LOT	–	–	200.	1000
REDUCING STATION (COMPLETE)	2	40	600	80	1200
DK & BHD PENETRATIONS	21	4	10	84	210
PLUMBING & DRAIN SYSTEM	INCLUDED IN QUARTER'S EST.				
WASH WATER & POTABLE WATER SYSTEMS					
QUARTERS PIPING INCLUDED IN QUARTERS ESTIMATE					
SUCTION & FILL LINES TO AND FROM TANKS.					
PIPE	250'.	1.4	10^{50}	350.	2625
VALVES	6.	2.0	150	12	900
MISC					
SEWAGE TREATMENT SYSTEM.					
PIPING SYSTEM IN QUARTERS INCLUDED IN QUARTERS ESTIMATE.					
PLANT INSTALLATION (INCL FDNS, ETC)	–	–	–	240.	20,000
MISC PIPING, OVERBOARD DISCH., ETC	–	–	–	200	2,000

J. Kane

5/8/78

ESTIMATE SHEET
NAVFAC (FPO-1) Y.F.N.B. - HULL CONVERSION

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
BALLAST SYSTEM:-					
BASED ON 40% GL. 40 INSTALLATION APPROX 2000' PIPE; 24 VALVES; ELLS; TEES; MISC FITTINGS; DK & BHD PENETRATIONS	SIX TANKS.			6,910	46,000
HEATING & A.C. SYSTEM			INCLUDED IN QUARTERS EST.		
VENTILATION SYSTEM					
QUARTERS VENTILATION INCLUDED IN QUARTERS ESTIMATE					
MACHY & PROPULSION ROOM & FWD PROPULSION ROOM:					
FANS	8	24	500	192	4,000
SUPPLY & EXHAUST DUCT SAY 400' (INCL TERMINALS, FITTINGS, GOOSENECKS, HANGERS, ETC)	16 TONS	500/T.	-	8,000	15,000
FUEL OIL SYSTEM.	20 TANKS			2,600	30,000
LUBE OIL SYSTEM (3 ENGINES)				300	3,000
DIRTY LUBE OIL SYSTEM				200	2,000
CO_2 SYSTEM				300	3,000
FUEL OIL DAY TANKS (FAB & INSTL)	3	72	200	216	600
LUBE OIL HEAD TANKS (FAB & INSTL)	3	72	200	216	600
VENTS & SOUNDS.	-	-	-	3000	25,000
ENGINE EXHAUST	-	-	-	600	5,000
DECK DRAINS	-	-	-	400	2,000

J Kane

5-8-78.

ESTIMATE SHEET
NAVFAC (FPO-1) YFNB - HULL CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
EQUIPMENT INSTALLATION					
MACHY & PROPULSION ROOM					
CAT 379 MARINE GEN SET	2.	-	71,000	-	142,000
INSTALL ABOVE INCL. FDNS	2	120	500	240	1,000
S.W. CIRC PUMPS	2.	-	3000	-	6,000
INSTALL ABOVE INCL. FDNS	2	64	400	128	800
S.W. SERVICE PUMP	ONE	-	3000	-	3,000
INSTALL ABOVE INCL FDNS		64	400	64	400
CLEAN LUBE OIL PUMP.	ONE		2500	-	2500
INSTALL ABOVE INCL FDNS		64	400	64	400
DIRTY LUBE OIL PUMP	ONE		2500	-	2500
INSTALL ABOVE INCL FDNS.		64	400	64	400
FUEL OIL TRANSFER PUMP.	ONE		2,700	-	2700
INSTALL ABOVE INCL FDNS		64	400	64	400
FUEL OIL PURIFIERS	TWO.		2,500	-	5000
INSTALL ABOVE INCL FDNS		64	400	128	800
BALLAST PUMPS	TWO.		3,000	-	6,000
INSTALL ABOVE INCL FDNS		64	400	128	800
AIR COMPRESSORS (190 CFM)	TWO		25,000		50,000
INSTALL ABOVE INCL FDNS.		80	700	160	1,400
AIR COMPRESSORS (18 CFM)	ONE		2000		2000
INSTALL ABOVE INCL. FDNS		32	200	32	200
AIR RECEIVER (18 CUB FT.)	ONE.		2000		2000
INSTALL INCL. FDNS		32	200	32	200
S.W. FIRE PUMP (NO 2)	ONE		2500		2500
INSTALL INCL FDNS		64	400	64	400
STRIPPING PUMP	ONE		2500		2500
INSTALL INCL FDNS		64	400	64	400
VAC CONTROL TANK & PRIMING SYS'M.	ONE.		4000		4000
		64	1000	64	1,000
VOIT SCHNIEDER 24G2 PROPULSION APT (INCL VERTICAL TUNNEL).	ONE	-	316,500	-	316,500
FDNS, EQUIPT & VERTICAL TUNNEL INSTALLATION	ONE	800.	1000	800	1000
CAT D 399 PROPULSION DIESEL FOR ABOVE	ONE	—	174,000	-	174,000

J. Kane.

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5-8-78.

ESTIMATE SHEET

NAVFAC (FPO-1) YFN8 - HULL CONVERSION

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
EQUIPMENT INSTALLATION (CONT'D)						
FWD PROPULSION ROOM						
S.W. FIRE PUMP (Nº1). (INCL FDNS)	ONE	64	2900	64	2900	2500
S.W. CIRC PUMP " "	2	64	3400	128	6800	6000
POTABLE & FRESH WATER PUMPS "	2	32	2300	64	4600	4000
FRESH WATER PUMPS "	2.	32	2300	64	4600	4000
EMERGENCY GENERATOR.	ONE.	80	-	80	17500	160,000
112.5 KVA TRANSFORMER	ONE.	64	2400	64	2,400	2,300
UNINTERRUPTABLE POWER SUPPLY	ONE	64	25,000	64	25,000	22,000
LINK BELT ABS-218 CRANE	ONE	-	166,000	-	166,000	
LINK BELT ABS-138 CRANE	ONE	-	141,000	-	141,000	
PEDESTAL FNDS FOR CRANE	TWO	INC	30,000	INC	60,000	
GEN. CONTROLS & POWER DIST'N.	LOT	400	200,000	400	200,000	50,000
POWER PANELS	24	24	1,000	576	24,000.	22,000
MISC. TANKS	6.	48	500	288	3,000.	
VOIT SCHNEIDER 24G2 PROPULSION (FWD) (INCL VERTICAL TUNNEL)	ONE.	-	316,500	-	316,500	
FDNS EQUIPT & TUNNEL INSTALLATIONS	ONE	800	1000	800	1000	
D 399 CAT PROPULSION DIESEL FOR ABOVE	ONE	-	174,000	-	174,000	
OUTFIT MISC STOREROOMS	-			1,000	20,000	
MAGNETIC COMPASS	ONE	48	-	48	2500	2200
DEPTH RECORDERS	2	48	-	48	50,000	45,000
RADAR	ONE	64	-	64	20,000	17,000
P.A. SYSTEM	ONE	144	-	144	10,000	7500
GYRO COMPASS	ONE	48	-	48	30,000	25,000
INTERCOM SYSTEM	ONE	144	-	144	15,000	14,000
V.H.F. RADIO.	ONE	48	-	48	6,500	6,000
SSB 150 RADIO	ONE	48	-	48	6000	5500
LORAN "C"	ONE	64	-	64	10,000	9,000
2.5.7 HONEYWELL CONTROL SYSTEM.	-	-	-	200	90,000	55,000
LIFERAFTS (25 MAN)	4	40	3750	160	15,000	
LIFEBELTS & BUOYS	60.	-	16	-	960	
MISC LIFESAVING & FIREFIGHTING EQUIPT	-				10,000	

J. Kane

ESTIMATE SHEET

5-8-79. NAVFAC (FPO-1) YFNB - HULL CONVERSION

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
PAINTING:					
INNER BOTTOMS:					
BLASTING - 22,000 SQ.FT APPROX.	-	1.5HRS/100'	$10	330	2,200
PAINTING. (3-COATS) 22,000□'	660 GALS	2.5HR/-	$15	1650	9900
FUEL OIL TANKS:	20				
BLAST - 15,000 SQ FT APPROX	-	1.5HRS/	$10/	225	1500
PAINT (ONE COAT) 15,000 SQ.FT APPROX	150 GALS	2.5HRS/	$10/	375	1500
HOLD (CARGO AREA)					
BLAST - 8000 SQ FT.	-	1.5HR/	$10/	120	800
PAINT (THREE COATS) - 8000 □'	240 GAL'S	2.5HR/	$15/	600	3600
POTABLE WATER TANKS	2				
BLAST - 3500 SQ FT.	-	1.5HR/	$10/	53	350
PAINT (2 COATS)	70 GALS	2.5HR/	$15/	175	1050
WASH WATER TANKS	4				
BLAST - 4300 SQ. FT.	-	1.5HR/	10/	65	430
PAINT (3 COATS)	129 GAL'S	2.5HR/	15/	323	1935
CENTER WELL					
BLAST - 2200 SQFT	-	1.5HR/	10/	33	220
PAINT (3 COATS)	66 GALS	2.5HR/	20/	165	1320
AFT BALLAST TANKS	2				
BLAST 2200 SQ FT.	-	1.5HR/	$10/	33	220
PAINT. (3 COATS).	66 GAL'S.	2.5HR	15/	165	990
VOIDS					
BLAST 3300 SQ FT.	-	1.5HR/	$10/	50	330
PAINT (3 COATS)	99 GALS	2.5HR/	$15/	248	1485
CHAIN LOCKER (FWD).					
BLAST - 1000 SQ FT	-	1.5HR/	$10/	15	100
PAINT (3-COATS)	30 GAL'S	2.5HR/	$15/	75	450

ESTIMATE SHEET
NAVFAC (FPO-1) - Y.F.N.B. - HULL CONVERSION

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
MACHY & PROPULSION ROOMS					
BLAST 9800 SQ FT	–	1.5HR/	$10/	147	150
PAINT (3 COATS)	294GALS	2.5HR/	$20/	735	5880.
MAIN DECK					
BLAST 7500 SQ FT.	–	1.5HR/	$10/	113	750.
PAINT (3 COATS)	225	2.5HR/	$30/	563.	6750
ANTI-ROLL TANKS					
BLAST 3500 SQ FT.	–	1.5HR/	10/	53	350.
PAINT (3 COATS)	105	2.5HR/	20/	263.	2100.
MISC STOREROOMS ETC	LOT	–	–	500	2,000
HOUSE					
BLAST - 9000 SQ.FT.	–	1.5/	10/	135	900
PAINT (3 COATS)	270.	2.5/	30/	675	8100.
2"? INSULATION (PAINTING)	–	–	–	–	20,000
VERTICAL LADDERS 12 x 12'	144'			144	1440
RAILS & STANCHIONS (3 TIER) MAIN DECK & SUPERSTRUCTURE DECKS	600	1.5	10	900	6000
MANHOLES	14	32	60	448	840
ELECTRICAL & ELECTRONIC SYSMS: CABLE, FITTINGS FIXTURES	–	–	–	22,000	70,000
STERN ROLLER	ONE			800	15,000
MISC. DK FITTINGS & EQUIPMENT	LOT			1,000	10,000
REPAIR ALLOWANCE FOR DAMAGED STEEL	–			1,000	3,000

ESTIMATE SHEET

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
A.B.S. & Regulatory Bodies Fees.				-	30,000	
Dock Trials, Sea Trials, Tests				2000	30,000	97,735.
Drydocking. (20 Days).			1500	-	30,000	
Berthing & Services.	90 Days		1500	-	135,000	
Supv'n & Services (16%)				15,699	-	
				113,346	5,188,384	

Labor 113,346 × 24.00 = $ 2,720,304
Material = $ 5,188,384
Handling Charges 15% = $ 251,098 (Excludes New Stl & Equipt Purch.)

Sub-Total = 8,159,786 — 8,160,000

Shipyard Engineering = 300,000

G.M.D.I. Engineering = 350,000

G.M.D.I. Constn Inspn = 150,000

Towing Charges = 50,000

$ 9,009,786

Say. $ 9,010,000

J Kane

5-10-78 NAVFAC (FPO-1) YFNB – HULL CONVERSION

COMPOSITION OF G.M.D.I. ADMINISTRATIVE HANDLING CHARGES.

SUMMARY SHEET.

	4%		8%.
SHIPYARD CONSTRUCTION	- $5,926,900		–
" ENGINEERING	- $300,000.		
G.M.F.E	- $1,804,500	-	428,600
SHIPS MOVEMENT COSTS.-	–	–	50,000
		–	–
TOTAL	8,031,400		478,600

CHARGES 8,031,400 × ·04 = 321,256

" 478,600 × ·08 = 38,288

TOTAL. 359,544

SAY 360,000

J. Kane

5-9-78

NAVFAC (FPO-1) DRILLSHIP CONVERSION

SUMMARY SHEET

1/	SHIPYARD CONSTRUCTION (INCL'S EQUIP'T PURCHASES)	=	$ 3,231,000
2/	SHIPYARD ENGINEERING	=	$ 300,000
3/	G.M.D.I. ENGINEERING	=	$ 350,000
4/	G.M.D.I. PROGRAM MANAGMENT	=	$ 94,000
5/	G.M.D.I. CONST'N INSPECTION	=	$ 150,000
6/	SHIP MOVEMENT COSTS	=	$ 50,000
7)	TOTAL EST'D COST	=	$ 4,175,000
8)	DRILLSHIP AQUISITION COST	=	$ 1,800,000
9)	G.M.D.I ADMINISTRATION HANDLING CHARGE	=	223,000
	GRAND TOTAL	=	$6,198,000

NOTE: ALL LABOR, MATERIAL AND EQUIPMENT COSTS ARE BASED ON PRICES AS OF MAY 1978, WITH NO ESCALATION INCLUDED

J. J. Walker

MAY 1 1978

J. Kane.

04072-010000

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5-9-78

ESTIMATE SHEET

NAV FAC (F.P.O.1) - DRILL SHIP CONVERSION

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
ESTIMATE BASED ON FOLLOWING DRAWINGS:						
D-4072-A001 ALT A (SHTS 1, 2 & 3)						
& DETAILS SUPPLIED BY J. SCHAFF						
1) REMOVALS.						
DERRICK. (2 LIFTS).	ONE	160	200	160	1200	
" LIGHTING	LOT	32	20	32	20	
" HOSE & PIPING RUNS.	"	48	20	48	20	
" WATER TABLE & CROWN BLOCK.	"	80	600	80	600	
" TRAVELLING BLOCK & ROTARY TOOL.	"	160	200	160	200	BOX FOR STORAGE.
HEAVE COMPENSATOR (BOX FOR STORAGE)	"	120	200	120	200	
RIG FLOOR						
DRAWWORKS SHELTER	ONE	48	20	48	20	
DRAW WORKS (COMPLETE)	ONE	120	200	120	200	
ROTARY DRIVE	ONE	64	20	64	20.	
" TABLE	ONE	64	20	64	20.	
DRILLERS CONSOLE.	ONE.	120	200	120	200	
RAT HOLE	ONE	24	10	24	10	
MOUSE HOLE	ONE	24	10	24	10	
B.O.P. ACCUMR UNIT	LOT.	24	10	24	10	
" " " PLATFORM & LADDER.	LOT.	40	20	40	20	
PIPE RACKER CONTROL UNIT.	ONE	16	10	16	10	
AIR TUGGERS	3.	16	10	48	30.	
DRILL PIPE RACKER DRIVE UNITS	2.	24	20	48	40.	
WIRE LINE ANCHOR	ONE	8	10	8	10	
WALKWAY & HANDRAILS FROM FR. 54 TO FR. 100 (APPROX. 91'-0").	LOT	120	50	120	50.	
MISC. PIPING.	LOT	200	100	200	100	
" ELEC'L CABLE & WIREWAYS.	LOT.	100	50	100	50.	
WOOD DECKING & RIG FLOOR STEEL.	LOT.	200	50	200	50	
GUIDE LINE TENSIONERS	4.	24	20	96	80	
" " " SHEAVES.	4.	12	5	48	20.	
GAS SEPERATOR & PIPING.	ONE.	64	50	64	50	
MISC.	-	-	-	500	100.	

J. Kane

ESTIMATE SHEET

5-9-78. NAVPAC (FPO-1) DRILLSHIP CONVERSION

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
ITEM #1 CONT'D					
MEZZANINE DECK'S (F&A)					
STORAGE REELS	4	24	20	96	80
PLATFORM, HANDRAILS & LADDERS	2.	64	25	128	50.
CASING RACK					
STEEL WORK - INCLUDING PIPE TROUGH & PIPE RAMP.	LOT	400	200	400	200
WORK PLATFORM (WOOD DECKING) & HAND RAIL.		80	50	80	50.
AIR RECEIVERS	2.	16	10	32	20
DRILL PIPE RACKER					
PIPE RACKER (SIX SECTIONS)	ONE.	96/SECT.	300	576	300
SKATE	ONE	40	25	40	25
SKATE DRIVE.	ONE	48	25	48	25
MISC. PIPING & CYLINDERS.	LOT	200	100	200	100
DRIP PAN	ONE	48	20	48	20
WALKWAY.	—	40	20	40	20.
FOUNDATIONS		200	50	200	50
FWD. MAST.	ONE	40	20	40	20
ACTIVE TANK HOUSE					
PLATFORM (MAIN)	ONE	80	20	80	20
" MUD LOADING.	ONE	40	20	40	20.
LADDERS & HANDRAILS	LOT	120	50	120	50.
MUD MIXING HOPPER	ONE	16	10	24	10
DEGASSER	ONE	16	10	16	10
DESANDER	ONE	16	10	16	10
DESILTER	ONE	16	10	16	10
SHALE SHAKER	ONE	24	10	24	10
LIGHTNIN MIXERS.	2.	16	10	32	20
PUMP HOUSE.	ONE	80	20	80	20
MISC LIGHTING FIXTURES, CABLES, ETC.	LOT	120	50	120.	50.

J. Kane

ESTIMATE SHEET

5 - 9 - 78 NASPAC (FPO-1) DRILLSHIP CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
ITEM #1 CONT'D						
MAIN DECK						
SUB BASE.	ONE.	240	2500	240	2500.	
CENTERWELL CART & FOUNDATIONS F/A.	LOT	48	50	48	50.	
" " RAILS.	2.	24	10	48	20.	
MOONPOOL PLATFORMS. P/S.	2.	24	10	48	20	
RISER TENSIONER COUNTERWEIGHT & TUBES	4	40	20	160	80	
T.V. " "	2.	40	20	80	40	
" REEL & FDN	ONE	24	10	24	10	
" , AIR TUGGERS & FDN'S	2	24	10	48	20	
B.O.P. HOSE REELS & FDNS.	2.	40	50	80	100	
MOON POOL AIR TUGGERS & FDNS	3.	24	10	72	30	
HYD'C UNIT FOR TENS & HEAVE COMP'R	ONE.	16	10	16	10	
FDNS. FOR B.O.P. & LOWER MARINE RISER STWGE.	2.	24	20	48	40	
MUD SURGE TANKS (440 CUB. FT EACH)	2	24	20	48	40	
CEMENT SURGE TANK "	ONE.	24	20.	24	20	
AFT MOORING WINCHES & FDNS (BULWARK CUTS)	2.	128	50	256	100	
" " FAIRLEADS	4	40	20	160	80.	
DRILLING LINE	ONE	24	10	24	10	
BULK MATERIAL LOADING MANIFOLD P/S.	2.	80	100	160	200	(DECK CLOSURE)
MISC. DIVER & MUD LOGGING EQUIPT, FR FDNS.	LOT	-	-	400.	200	
OXYGEN BOTTLES.	12.	8	5	96	60.	
AIR TUGGER FR. 95	ONE.	16	10	16	10	
SECOND DECK :-						
FR 8-26:						
BULK CEMENT STORAGE TANKS (1150 C.FT. EACH)	2.					INCL
HALLIBURTON UNITS	2			400	250.	REMOVAL
" CONTROL PANEL & PLATFORM	ONE.					OF SHELL SECTION.
FR 26-54:						
BULK MUD STORAGE TANKS (1250 CU. FT EACH)	4	64	50	256	200	
INCL MN DK CUTS. (24'-0" x 10'-0")	2.	100	50	200	100	
LIGHTNIN MIXERS	4	24	10	96	40	
MUD HATCHES	4	40	10	160	40	
STORAGE BINS	4.	24	10	96	40	

J. Kane

ESTIMATE SHEET

5-9-78 NAVPAC (FPO-1) DRILLSHIP CONVERSION

ITEM # 1 CONT'D DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
SECOND DK (CONT'D)					
FR. 26-54 (CONT'D)					
ACCUMULATOR BOTTLES & FDNS. (49 BOTTLES)	LOT	120	50	120	50
FR 54-71:					
STORAGE BINS	62.	4	-	248	100
M/C. SHOP WORKBENCH	ONE	16		16	10
" LATHE	ONE	40		40	20
" MISC. EQUIPT.	LOT.	100		100	50
FR. 71-100					
H.P. AIR COMPRESSOR'S & FDNS	2	48	25	96	50
B.O.P. AIR COMPRESSOR & FDNS.	ONE	48	25	48	25
FR 100 - AFT.					
STRIP DIVERS STORES AREA	LOT	40	20	40	20
" NATIONAL QUARTERS	LOT.	240	100	240	100
HOLD					
MUD PUMPS (INCL DECK CUTS-2)	2.	200	50	400	100
" MIXING PUMPS	2	48	20	96	40
BOAT DECK					
STRIP 4 MAN STATEROOM (PORT SIDE)	LOT	48	25	48	25
SUPERSTRUCTURE DECK.					
STRIP 4 MAN STATEROOM (PORT SIDE)	-	48	10	48	10
" OFFICE (STB'D SIDE)	-	48	10	48	10
" 3 MAN STATEROOM (STBD SIDE)	-	48	10	48	10
" CAPTAINS STATEROOM	-	48	10	48	10
" SUPERINTENDENT "	-	48	10	48	10
GENERAL:					
HIGH PRESS. PIPING SYSTEM	LOT			600	200
RIG FLOOR HYD'C PIPING SYSM.	"			80	20
B.O.P. ACCUMULATOR PIPING SYSM	"			80	20
BULK MUD SYSTEM PIPING.	"			200	50
HIGH PRESS. MUD PIPING SYSM.	"			200	50
CEMENT SYSTEM PIPING.	"			200	50
DIVERTER " "	"			120	50
WELL TEST " "	"			120	50

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ESTIMATE SHEET

5-9-78. NAVPAC (F.PO-1) DRILLSHIP CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
ITEM # 1 CONTD.					
ELECTRICAL & ELECTRONIC SYSTEMS (INCL WIREWAYS) FOR DRILLING SYSTEMS.	LOT			1000	500
VENTILATION SYSTEMS RELATED TO EQUIPMENT REMOVED.	LOT.			400	500

JKane.

ESTIMATE SHEET

5 - 9-78 NAVPAC (FPO - 1) DRILLSHIP CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
2) MODIFICATIONS, NEW INSTALLATION'S & EQUIPMENT UPGRADING					
HOLD					
FAB & INSTALL THRUSTER TUNNEL (FR. #12) (INCL CASTINGS)	ONE			2,000	12,000
INSTALL 500 H.P. TUNNEL THRUSTER (FR #12)	ONE.			800	72,000
RELOCATE STANCIONS	3.	80	50	240	150
CONVERT D.W. TANKS TO BALLAST TANKS (FR # 16-#26)(#1 P/S)	-			-	-
CLEAN OUT LIQUID MUD TANKS AND CONVERT TO BALLAST TANKS (FR# 44-FR# 54)	4	64	200	256	800
CONVERT D.W. TANKS TO BALLAST TANKS. (FR# 54-FR# 71)(#2 P/S)				-	-
FAB & INSTALL FREE FLOODING, HINGED DRILL WELL PLUG. (SEE VFNB EST.)	ONE			-	88,960
CONVERT D.W. TANKS TO BALLAST TANKS (FR# 71 - FR# 100)(#3 P/S).				-	-
CONVERT D.W. TANKS TO WASH WATER TANKS (FR# 100 - FR# 118)(# 4 P/S) ???				-	-
PURCHASE & INSTALL AFT THRUSTER (INCL FDNS, ETC.)	ONE			400	225,000

J Kane

7

ESTIMATE SHEET

5-9-78. NAVPAC (F.P.O-1) - DRILLSHIP CONVERSION

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
ITEM № 2 CONT'D					
SECOND DECK:					
FR# 9 - FR# 26.					
FAB. & INSTALL DECK IN WAY OF TANK REMOVALS & DECK CUTS 5.0 L.T. @ 5560/L.T.	LOT			-	27,800
INSTALL THRUSTER DRIVE COMPLETE WITH FDNS, PIPING, ELECTRICAL & VENT'N.	LOT.			1000	2,500
FR# 26 - FR# 54					
FAB & INSTALL DECK IN WAY OF TANK & MUD PUMP REMOVALS. 24.5 TONS.				-	136,400
FR# 54 - FR# 71					
REINSTALL STORAGE BINS (BINS EXISTING)	27	4	10	108	270.
FAB & INSTALL ELEC'L SHOP & SECURITY BHD'S & DOORS AS PER DWG Nº D-4072-A001, SHT#3, ALT. A.	LOT.			1200	2,000
FR# 71 - AFT					
INCREASE WASH, SHOWER & HEAD FACILITIES TO ENCOMPASS DIVERS STORES SPACE.	LOT	-	-	800	5,000.
CONVERT NATIONAL QUARTERS SPACE TO LOUNGE & LIBRARY.	LOT			800	10,000.
RECONDITION DIESEL GENERATOR PACKAGES WHERE NECESSARY.	LOT.			-	200,000
ELECTRICAL EQUIP'T	LOT.			2000	20,000

J Kane

8.

5-9-78.

ESTIMATE SHEET

NAVPAC (FPO-1) - DRILLSHIP CONVERSION.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
ITEM # 2 (CONT'D)					
MAIN DECK.					
FAB & INSTALL CABLE CHUTES P/S 8.0 L.T. @ 5560/LT.	2			-	44,480
FAB & INSTALL FLUSH W.T. HATCH	ONE			3630	13,800
FAB & INSTALL REMOVABLE HATCH COVER OVER MOON POOL	ONE			3840	14,600
LOWER 25.0T & 40.0T CRANES	2	400	1000	800	2000
REPAIR/REPLACE BULWARKS IN WAY OF AFT WINCH & FAIRLEAD REMOVALS. 2.0 L.T. @ 5560/L.T.	LOT.				11,120
BOAT DECK:					
CONVERT 4 MAN STATE ROOM (PORT SIDE) TO STOREROOM				250	1000
SUPERSTRUCTURE DK					
INSTALL: 2 - ONE MAN STATEROOMS; 2 - TWO MEN STATEROOMS.; 2 - OFFICES; 4 - WASH & TOILET FACILITIES.	6 SPACES	17,500			105,000
GENERAL:					
ADDITION TO BALLAST PIPING SYS'M (LIQUID MUD TANKS)				500	2000
WASH WATER PIPING SYSTEM FROM No 4 TANKS P/S				2000	10,000

J. Kane

ESTIMATE SHEET

5-9-78 NAVMAG (FPO-1) _ Drill Ship Conversion.

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
Item # 2 Cont'd					
Modify Electrical & Electronic Sysms.				5000	20,000
Purchase & Install Dynamic Positioning System (Complete)				1,000	125,000
Paint New & Disturbed Areas.	-			2000	15,000
Install Photo Lab.	-			-	50,000
Bi-Annual Drydocking & Repairs.				-	500,000
Drydocking (Thruster & D.P. Inst'n)	5 days		1500	-	7500
Berthing & Services	45 days		1500	-	67,500
A.B.S. & Regulatory Bodies				-	25,000
Tests & Trials.				2000	15,000
Supvn & Services				6957	-
				50,441	1,764,850

Labor 50,441 @ 24.00/hr = $ 1,210,584.

Material = 1,846,850.

15% Handling Charge = 173,414. (Excludes New Steel & GM01 Furn. Equip)

Sub Total = $ 3,230,848

JKane

5/15/78. NAVFAC (F.P.O-1) DRILLSHIP CONVERSION

COMPOSITION OF G.M.D.I. ADMINISTRATIVE HANDLING CHARGES

	4%	8%
S/4 CONSTN	$ 2,749,000	-
S/4 ENG'G.	300,000	
G.M.F.E.	$ 317,000	$ 165,000
SHIPS MOVEMENT COSTS.	-	$ 50,000
		-
DRILLSHIP AQUISITION	$ 1,800,000	-
	5,166,000	$ 205,000

CHARGES 5,166,000 × .04 = 206,640

" 205,000 × .08 = 16,400

TOTAL ADMIN CHARGES = 223,040

Say $ 223,000

APPENDIX R

ABS WORLDWIDE TECHNICAL SERVICES, INC.

CONDITION SURVEY ON YPNB 4I

ABSTECH

ABS Worldwide
Technical Services, Inc.

45 Broad Street
New York, N.Y. 10004

Report	No.	Project No.	Date	Office:
	78-263NN	WTS-10022	4 May, 1978	Newport News, Va.

THIS IS TO CERTIFY that the undersigned Representatives to ABS Worldwide Technical Services, Inc., did, at the request of Glomar Marine International, Inc., attend the U.S. Navy Barge "YFNB 41", while the vessel lay afloat in a partially laden condition at St. Helena's Annex, Norfolk, Virginia on 11 April, 1978 and subsequent date in order to examine vessel for purpose of Condition Survey. For further particulars see report as follows:-

1. The vessel was examined while afloat at a draft of approximately 3'-6" forward and aft.

2. The vessel is a Barge 260 feet in length capable of carrying dry cargo and contains a total of 8 cargo holds, four on the starboard side and four on the port side. The enclosed main deck over the cargo holds gives additional cargo and storage capability. Access to the cargo holds for loading is thru eight accesses atop of the enclosure, or eight side accesses (approximately 12' x 10') at the main deck level thru the sides of the enclosure.

3. An electric anchor windlass is fitted on both the bow and stern. One anchor is located on the bow. No other anchors were found. Several lengths of anchor chain were found in each of the forward and after chain lockers. The forward and after chain lockers were internally examined, steel surfaces found coated and the internals considered satisfactory.

4. The cargo hold spaces are bounded by a series of wing void tanks along the port and starboard sides and double bottom voids under the holds. Representative wing and double bottom voids were opened at this time for examination. Double bottom voids as examined, were found fully coated with plate surfaces and structure in satisfactory condition. Wing void tanks as examined, were found with coating failure evident in some tanks. The internals were considered as satisfactory with minimal or no wastage evident.

5. The steel enclosure over the main deck cargo hatches was examined and found to have been previously doubled along the top surface at the forward and after ends over apparent holed areas. At the after end, approximately 150 sq. ft. of area has been doubled, and approximately 25 sq. ft. at the forward end has been doubled. Doublers as installed were of 1/4" steel plate continuously welded. The remaining surfaces of the enclosure were considered satisfactory. Top and side access doors were found sealed.

6. The after rake void spaces were internally examined, surfaces rusted in areas and in bad condition.

CONTINUED

This Certificate is granted subject to the condition that it is understood and agreed that neither the Corporation nor any of its Committees, nor any of its Officers, Representatives, Agents or Employees is under any circumstances whatever to be held responsible for any inaccuracy in any report or certificate issued by this Corporation or its Representative or for any of its or their errors of judgment, default or negligence.
WWTS-2 (1-74)

ABS Worldwide
Technical Services, Inc.

45 Broad Street
New York, N.Y. 10004

Report	No.	Project No.	Date	Office:
	78-263NN	WTS-10022	4 May, 1978	Newport News, Va.

7. The vessel is of fully welded construction and visible welded butts and seams appeared as satisfactory.

8. The forward living quarters and after machinery spaces were examined and the condition of the structure considered as satisfactory. Areas are fully painted and paint considered as intact.

9. The main deck and forecastle deck were examined and considered satisfactory.

10. Representative cargo holds were examined with surfaces and structural members considered satisfactory. The vessel is in a partially loaded condition with crates of machinery and spare parts.

11. The side shell as visible above the waterline was examined and found set in in numerous locations, the most severe as follows:-

    (a) Starboard side shell in way of No. 3 wing void set in up to approximately 4" for 30 sq. ft. affecting the upper two side shell longitudinals.

    (b) Starboard side shell in way of No. 2 wing void set in up to approximately 3-4" for approximately 30 sq. ft. affecting the upper two side shell longitudinals.

    (c) Starboard side shell in way of No. 4 wing void set in up to approximately 6" for an area of 20 sq. ft. affecting the 2nd. and 3rd. side shell longitudinals.

    (d) Port side shell plating in way of No. 4 and 6 port wing void tanks set in to various degree affecting internal side shell longitudinals.

    (e) Port side shell sheer strake knuckle at main deck junction heavily set in at one point several inches at approximate midship location.

12. After machinery space area was found to contain the following equipment:

    (a) One 671 G.M. Diesel driving a 60 KW A.C. generator.
    (b) One 2 cylinder G.M. Diesel driving a 20 KW D.C. generator.
    (c) One electric driven centrifugal fire pump.
    (d) One electric switchboard containing circuit breakers and distribution switches.

    The switchboard wiring appears deteriorated in some areas. Electric wiring thruout the vessel as visible appeared in satisfactory condition with some lighting fixtures disconnected or missing. No megger

CONTINUED:

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WWTS-2 (1-74)

ABSTECH

ABS Worldwide
Technical Services, Inc.

45 Broad Street
New York, N.Y. 10004

Report No.	Project No.	Date	Office:
78-263NN	WTS-10022	4 May, 1978	Newport News, Va.

Item No. 12 continued:

readings were taken.

13. A fixed 5 bottle CO_2 system is installed serving the after machinery spaces.

14. Conditions as noted under Item 11 of this report will require drydocking to repair same and will be subject to further examination at that time.

GEORGE A. SEIRMARCO - REPRESEN.   HUGH F. HANCOCK - REPRESENTATIVE

This Certificate is granted subject to the condition that it is understood and agreed that neither the Corporation nor any of its Committees, nor any of its Officers, Representatives, Agents or Employees is under any circumstances whatever to be held responsible for any inaccuracy in any report or certificate issued by this Corporation or its Representative or for any of its or their errors of judgment, default or negligence.
WWTS-2 (1-74)

APPENDIX S

COST SUMMARY AND DEDICATED HULL COSTS

04072

NAVFAC: Scenario Cost Comparison

Arrangement		Scenario ①		Scenario ②		Scenario ③	
LEASE	Elapsed Days	137		43		95	
	Cost	$ 1,375,172.		280,746.		$ 1,073,705.	
	Travel	40,221.		8,169.		29,800.	
	Total	1,415,393.		288,915.		1,103,505.	
CONTRACT		No W/E	Work W/E	No W/E	Work W/E	No W/E	Work W/E
	Elapsed Days	111	95	26	20	58	44
	Cost	$ 1887,391.	$ 1623,458.	$ 441,323	$ 341,326.	$ 1,036,070	$ 792,829
	Travel	2635.	2,075.	951.	710.	1,357.	761.
	Total	1,890,026.	1,625,533.	442,274.	342,036.	1,037,427	793,590
DEDICATED PLATFORM	Elapsed Days	142		38		87	
	Cost	$ 378,146.		$ 75,302		$ 236,605.	
	Travel	43,461.		9,897.		32,082.	
	Total	421,607.		85,199		268,687.	

Notes:

1. In "Contract", equipment cost is based upon equipment being on a 5 year contract.
2. In "Dedicated Platform", the costs are operational costs only, and do not include the costs of the platform nor the modification cost.

5-19-78

MADE BY DJG GLOBAL MARINE DEVELOPMENT INC. W.O. No./A.F.E. No. 04072

CHECKED BY ESTIMATE SHEET SHEETS ___ SHEET NO. 1

DATE 5-15-78 TITLE NAVFAC: SCENARIO 1

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
DEDICATED PLATFORM					
MODIFY YFNB TO WORK PLATFORM	REFER SEPARATE SCHEDULE.				
MOBILIZATION OF PERSONNEL & EQUIPMENT AT PORT HUENEME					
PREPARE PLATFORM FOR INSTALLATION OF OCE INVENTORY ITEMS				* 696	2,875
REMOVE TIE DOWN HARDWARE				* 522	2,300
PROVISIONS					
16 PEOPLE 102 DAYS @ 8.50/MAN/DAY =	13,872				
47 – 40 – – =	15,980				
					29,852
FUEL: DIESEL #2 @ $106.00/LT	691	LT			73,246
LUBE OIL: 142 DAYS @ 7.50/DAY =					1,065
GENERAL CONSUMABLES: 142 DAYS @ 25.00/DAY =					3550
PAYROLL COSTS:					
CREW (16)	236,152				
UCT (7)	29,106				
PROJECT (24)	—				
TOTAL					265,258
SUB-TOTAL					378,146
TRAVEL EXPENSE:					
CREW (16)	-0-				
UCT (7)	4235				
PROJECT (24)	39,226				
SUB-TOTAL					43461
TOTAL ESTIMATED COST:					421,607

* INCLUDED IN PAYROLL COSTS.

SCENARIO 1 SCHEDULE

ELAPSED DAYS 142

Activity	Work Days	Completion (elapsed day)
(1) TRANSIT TO S/Y	.5	
(2) MODIFY YFNB TO WORK PLATFORM	LEAD TIME 9 MONTHS	
(3) TRANSIT S/Y TO PORT HUENEME	1	1
(4) PREPARE PLATFORM FOR ADDITION OF OCE INVENTORY ITEMS	7	10
(5) INSTALL & TEST OCE INV. ITEMS	6	18
(6) TRANSIT PT. H. TO PT. ALLEN KAUAI	25	43
(7) SEA TRIALS & TRAINING	13	60
(8) RETRIEVE (5) OLD ARRAYS	7	71
(9) DEPLOY (9) NEW ARRAYS	14	83
(10) RELOCATE (4) S.W. ARRAYS	6	99
(11) TRANSIT PT. A. TO PT. H.	25	123
(12) DEMOBILIZE AT PT. H. INCLUDING REMOVAL OF OCE INV. ITEMS & REFURBISH OF PLATFORM DUE TO REMOVAL OF ITEMS	12	142

Time scale (days): 0, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161

Weeks starting day	0	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140
HP USAGE: -0-																					
400	4	5	4																5	5	2
1000			3	7	7	7	1									6	7	7	5		
1500	(.5)																				
FOOD: DAYS	7	7	7	7	7	7	4	5	5	5	5	5	5	5	1	7	7	5	7	7	2
PERSONNEL	16	16	16	16	16	16	16 / 47	47	47	47	47	47	47	47	47	16	16	16	16	16	16

CREW = 16
UCT = 7
PROJECT = 24
47

16	47
42	4
1	35
16	1
6	
37	
102	40

YFNB CONVERTED TO PLATFORM

NAVFAC - SCENARIO 1 - SCHEDULE

JOB NO. 04072

MADE BY DBL

DATE 5-78

JAB 04072

5-15-78 NAVFAC Scenario 1

FUEL

1. Transit to Port Hueneme
$\left[(.5\text{ days})(1500\text{ HP}) + (.5\text{ day})(400\text{ HP})\right]\left(\frac{24\text{ hrs}}{\text{day}}\right)\left(\frac{.45}{54}\right) =$ 190 cu ft.
2. At Port Hueneme
$(13\text{ days})(400\text{ HP})(0.2) =$ 1040 CF
3. Transit Pt. H. to Pt. Allen Kauai
$(25\text{ days})(1000\text{ HP})(0.2) =$ 5000 CF
4. Sea Trials & Training
$(13\text{ days})\left(\left[(1500\text{ HP})\left(\frac{4\text{ hrs}}{\text{day}}\right)\right] + \left[(1000\text{ HP})\left(\frac{8\text{ hrs}}{\text{day}}\right)\right] + \overset{18,800}{\left[(400\text{ HP})\left(\frac{12\text{ hrs}}{\text{day}}\right)\right]}\right)\left(\frac{.45}{54}\right) =$ 2037 CF
5. Retrieve, Deploy, and Relocate Arrays
$(27\text{ days})\left(\left[(1500\text{ HP})\left(\frac{4\text{ hrs}}{\text{day}}\right)\right] + \left[(1000\text{ HP})\left(\frac{8\text{ hrs}}{\text{day}}\right)\right] + \left[(400\text{ HP})\left(\frac{12\text{ hrs}}{\text{day}}\right)\right]\right)\left(\frac{.45}{54}\right) =$ 4230 CF
6. Transit Pt. Allen to Pt. Hueneme
$(25\text{ days})(1000\text{ HP})(0.2) =$ 5000 CF
7. At Pt. Hueneme
$(12\text{ days})(400\text{ HP})(0.2)$ 960 CF
8. Weekends (other than transit) 13
$(26\text{ days})(400\text{ HP})(0.2) =$ 2080 CF

70% cap: 20537 CF

$\div 42.5\ \frac{CF}{LT} =$ 100% cap: 29339 CF

691 LT

Crew Size:

Crew	16	Scenario 1 (= 3)
UCT	7	
Project	24	
	47	

04072

5-15-78 NAVFAC - SCENARIO 1

TRAVEL

CREW - -0-

UCT - 7 people

PER DIEM

DAYS 40 - 43 = 4 DAYS

DAYS 100 & 101 2 DAYS

6 DAYS @ 35.00 : $ 210 -

MILEAGE -

PT H TO LAX RD TRIP = 180 MI

DAYS 41, 42, 43 & 100

4 DAYS @ 30 MI : 120 MI

300 MI @ .17 = 51 -

AIRFARE

LAX TO HONOLULU - RD TRIP 300

HONOLULU TO PT ALLEN -- 44

344 -

7 MEN x 605.00/MAN = 4235 -

4
18
1
21
44
20
64

PROJECT

OPS DIRECTOR

PER DIEM DAY (-1), 1-19 = 20 DAYS

DAYS: 40-43, 48-49, 55-56, 62-63, 69-70, 76-77, 83-84, 90-91, 97-98 99, 100, 101, 123-143

64 DAYS @ 35.00 = 2,240 -

AIRFARE - WASH DC TO LAX - RD TRIP 414 -

MILEAGE LAX TO PT H 180 MI @ .17 : 31 -

DAILY MILEAGE DAYS 1-19 : (19) + 30 MI @ .17 : 97 -

AIRFARE - WASH DC TO LAX RD TRIP 414 -

LAX TO HONOLULU -- 300 -

HONOLULU TO PT ALLEN -- 44 -

WASH DC TO LAX RD TRIP 414

MILEAGE LAX TO PT H 180 MI @ .17 31 -

DAILY MILEAGE DAYS 124 - 142 = 19 DAYS @ 30 MI @ .17 : 97 -

$ 4082 -

04072

5-15-78 NAVFAC: SCENARIO 1

YFNB

PAYROLL COSTS

	NO OT RATE	O/T RATE	NO O/T	7 DAY WK	NO O/T	7 DAY WK	NO O/T	NO O/T	7 DAY WK
1 MASTER	126	185	14	25	40	25	12	66	50
2 MATES	246	420							
2 QM / 4 SEAMEN	152 / 248	280 / 456							
1 CHIEF ENGR	105	166							
2 ASST ENGRS	124	228							
2 MECH TECHS	218	340							
2 ELECT. TECHS	204	328							
16	1423	2403							

16 CREW

66 CREW DAYS (NO O/T) @ 1423/DAY = 93,918
50 " " (7 DAY WK) @ 2403/DAY = 120,150
214 068.

UCT 7

1 BOSUN	72	72
3 SEAMAN E4	105	105
3 SEAMAN E5	120	120
7	297	297

@ PT H 13 DAYS 13
+ W/E 4 DAYS 4
DAYS 40 (DEPARTURE) THRU 101 = 62 DAYS 62
DAY 124 (GET READY!): 1 DAY 1
+ 12 DAYS 12
+ W/E'S 6 DAYS 6
98

98 DAYS @ 297.00 = 29,106

04072

5-15-78 NAVFAC SCENARIO 1

TRAVEL (CONTD)

PROJECT (CONTD)

Remaining People. (23)

4
16
2
22

PER DIEM

Days 40-43, 48-49, 55-56, 62-63, 69-70, 76-77, 83-84, 90-91, 97-98, 100, 101

22 DAYS @ 35- = 770-

AIRFARE WASH DC TO LAX RD TRIP 414-

LAX TO HONOLULU -- 300-

HONOLULU TO PT. ALLEN -- 44-

1528-

23 x 1528- = 35,144

4082-

39,226-

MADE BY CRL GLOBAL MARINE DEVELOPMENT INC. W.O. No./A.F.E. No. 04072

CHECKED BY ______ ESTIMATE SHEET SHEETS ____ SHEET NO. ____

DATE 5-16-78 TITLE NAVFAC : SCENARIO 2

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
DEDICATED PLATFORM					
MODIFY YFNB TO WORK PLATFORM	REFER SEPARATE SCHEDULE.				
MOBILIZATION OF PERSONNEL & EQUIPMENT AT PORT HUENEME					
PREPARE PLATFORM FOR INSTALLATION OF OCE INVENTORY ITEMS				* 174	1208
DEMOB: REMOVE TIE DOWN HARDWARE				* 174	748
PROVISIONS					
15 PEOPLE 26 DAYS @ 8.50/MAN/DAY	3315				
27 " 12 " — — —	2754				
TOTAL					6069
FUEL: DIESEL #2 @ $106.00/LT	157	LT			16,642
LUBE OIL: 38 DAYS @ 7.50/DAY =					285
GENERAL CONSUMABLES: 38 DAYS @ 25.00/DAY =					950
PAYROLL COSTS:					
CREW (15)	49,400				
UCT -0-	-0-				
PROJECT (12)	—				
TOTAL					49,400
SUB-TOTAL					75,302
TRAVEL EXPENSE:					
CREW (15)	-0-				
UCT -0-	-0-				
PROJECT (12)	9897				
SUB-TOTAL					9897
TOTAL ESTIMATED COST:					85,199

* INCLUDED IN PAYROLL COSTS.

Job No. 04072

YFNB Converted to Platform

NAV FAC - Scenario 2 - Schedule

Scenario 2 Schedule

Elapsed Days 38

	Work Days	Elapsed day (chart)
① Transit to S/Y	.5	
② Modify YFNB to Work Platform	Lead Time: 9 months	
③ Transit S/Y to Port Hueneme	1	1
④ Prepare Platform for installation of OCE Inv. items	4	5
⑤ Install & Test OCE Inv. items	3	10
⑥ Transit Pt. H. to San Diego	1	11
⑦ Sea Trials & Training	5	18
⑧ Tow SQUAW to moor site	.5	19
⑨ Moor SQUAW	7	30
⑩ Transit to San Diego	.5	30
⑪ Transit to Port Hueneme	1	31
⑫ Demobilize at Pt. H.	5	38
Σ =	28	

Elapsed days scale: 0, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161

HP usage:
- -0-
- 400: 5, 2, 3, 2, 2, 2, 3
- 1000
- 1500: 5, 1, 1

Food:
- Days: 7, 4, 1, 2, 5, 2, 5, 2, 1, 6, 3
- Personnel: 15, 15, 37, 15, 37, 15, 37, 15, 37, 15

Crew = 15

UCT = 0

Prunks = 12
37

15	37
7	1
4	11
12	
3	
26	12

Made by DBL

Date 5-78

04072

5-16-78 NAVFAC SCENARIO 2

YFNB

FUEL

(1) TRANSIT S/Y TO PT HUENEME

$[(.5\ \text{DAYS})(1500\ HP) + (.5\ \text{DAY})(400\ HP)](0.2)$ = 190 CF

(2) AT PT. HUENEME

$(7\ \text{DAYS})(400HP)(0.2)$ = 560 CF

(3) TRANSIT PT. H. TO SAN DIEGO

$(1\ \text{DAY})(1500\ HP)(0.2)$ = 300 CF

(4) SEA TRIALS & TRAINING

$(.5\ \text{DAYS})\left(\underbrace{\left[(1500\ HP)\left(\frac{4\ \text{HRS}}{\text{DAY}}\right)\right] + \left[(1000\ HP)\left(\frac{8\ \text{HRS}}{\text{DAY}}\right)\right] + \left[(400HP)\left(\frac{12\ \text{HRS}}{\text{DAY}}\right)\right]}_{=\boxed{18{,}800}}\right)\left(\frac{.45}{54}\right)$ = 784 CF

(5) TOW SQUAW TO MOOR SITE

$(.5\ \text{DAY})(1000\ HP)(0.2)$ = 100 CF

(6) MOOR SQUAW

$(7\ \text{DAYS})\left(\text{SAME AS (4) ABOVE} = 18{,}800\ \frac{\text{HP HRS}}{\text{DAY}}\right)\frac{.45}{54}$ = 1097 CF

(7) TRANSIT TO SAN DIEGO

$[(.5\ \text{DAY})(1000\ HP)] + (.5\ \text{DAY})(400HP)](0.2)$ = 140 CF

(8) TRANSIT TO PT. H.

$(1\ \text{DAY})(1500\ HP)(0.2)$ = 300 CF

(9) DEMOB AT PT. H.

$(5\ \text{DAYS})(400\ HP)(0.2)$ = 400 CF

(10) WEEKENDS

$5 \times 2 = (10\ \text{DAYS})(400HP)(0.2)$ = 800 CF

70% CAP 4671 CF

100% CAP = 6673 CF

÷42.5 CF/LT = 157 LT

DBB 04072

5-16-78

NAVFAC SCENARIO 2

PAYROLL COSTS

CREW

		NO O/T RATE	O/T RATE
1	MASTER	126	185
1	MATE	123	210
2	QM	152	280
4	SEAMAN	248	456
1	CHIEF ENGR	105	166
2	ASST ENGRS	124	228
2	MECH TECHS	218	340
2	ELECT. TECHS	204	328
15		1300	2193

38 DAYS @ 1300-/DAY: 49,400.

TRAVEL EXPENSE

PROJECT

OPS DIRECTOR

PER DIEM	DAY (-1), 1-10 = 11 DAYS @ 35.00/DAY	385.-
AIRFARE	WASH DC TO LAX RD TRIP	414-
MILEAGE	LAX TO PT H 180 MI @ .17/MI:	31-
DAILY MILEAGE	30 MI x 10 DAYS @ .17/MI ·	51-
PER DIEM WEEKENDS	13-14 (2), 20-21 (2), 27-28 (2), + 31-38 (8) + 39,40 (2)	
	16 DAYS @ 35.00/DAY =	560-
DAILY MILEAGE:	8 DAYS x 30 MI x .17/MI =	41-
		1,482 -

BALANCE OF PROJECT PEOPLE (11)

PER DIEM	DAY 10, 11 13-14, 20-21, 27-28, 30-31	
	10 DAYS @ 35.00 =	350-
AIRFARE	WASH DC TO SAN DIEGO RD TRIP	412-
MILEAGE	16 MI @ .17 =	3-
		765

(11) x 765 = 8415

\+ 1482

9897-

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CHECKED BY ESTIMATE SHEET SHEETS ___ SHEET NO. ___

DATE 5-16-78 TITLE NAVFAC: SCENARIO 3

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
DEDICATED PLATFORM					
MODIFY YFNB TO WORK PLATFORM	REFER SEPARATE SCHEDULE.				
MOBILIZATION OF PERSONNEL & EQUIPMENT AT PORT HUENEME					
PREPARE PLATFORM FOR INSTALLATION OF OCE INVENTORY ITEMS				* 696	3,335
DEMOB: REMOVE TIE DOWN HARDWARE				* 348	920
PROVISIONS					
16 PEOPLE 50 DAYS @ 8.50/MAN/DAY	6,800				
47 " 37 " "	14782				
					21,582
FUEL: DIESEL #2 @ $106.00/LT	550	LT			58,300
LUBE OIL: 87 DAYS @ 7.50/DAY =					653
GENERAL CONSUMABLES: 87 DAYS @ 25.00/DAY =					2,175
PAYROLL COSTS:					
CREW (16)	123,801				
UCT (7)	25,839				
PROJECT	—				
TOTAL					149,640
SUB-TOTAL					236,605
TRAVEL EXPENSE:					
CREW (16)	-0-				
UCT (7)					
PROJECT (24)	32,082				
SUB-TOTAL					32,082
TOTAL ESTIMATED COST:					268687

* INCLUDED IN PAYROLL COSTS.

SCENARIO 3 SCHEDULE

ELAPSED DAYS — 87

0 7 14 21 28 35 42 49 56 63 70 77 84 91 98 105 112 119 126 133 140 147 154 161

	WORK DAYS	ELAPSED DAYS
1) TRANSIT TO S/Y	0.5	
2) MODIFY YFNB TO WORK PLATFORM	LEAD TIME: 9 MONTHS	
3) TRANSIT S/Y TO PORT HUENEME	1	1
4) PREPARE PLATFORM FOR INSTALL OF OCE INV. ITEMS	7	10
5) INSTALL & TEST OCE INV. ITEMS	6	18
6) TRANSIT P.H. TO SITE	0.5	19
7) SEA TRIALS & TRAINING	13	38
8) INSTALL NAV. SYST. & CONST. MOOR	4	44
9) IMPLANT ARRAYS	1	45
10) TEST DELTA ARMS & CLUMP ANCHORS	8	57
11) INSTALL FINAL LEG & CLUMP ANCHOR	+1	58
12) IMPLANT PROJECTORS - TEST IMPLANT	+7	67
13) INSTALL CURRENT METER STRINGS	2	71
14) TRANSIT SITE TO PT.H.	0.5	71
15) DEMOBILIZE AT PT.H.	12	87
Σ: 63		

HP USAGE: -0-, 400, 1000, 1500

FOOD DAYS: 7 7 4 5 5 5 5 5 5 5 1 7 3

PERSONNEL: 16 16 16 47 47 47 47 47 47 47 47 16 16

CREW =	16	16	47
UCT =	7	14	1
PROJECT =	24	4	35
	47	13	1
		3	
		16	
		50	37

YFNB CONVERTED TO PLATFORM

NAV FAC - SCENARIO 3 - SCHEDULE

JOB NO. 04072

MADE BY DBL

DATE 5-78

C4072

5-16-78 NAVFAC SCENARIO 3

YFNB

FUEL

① TRANSIT TO PT. H.	190 CF
② AT PT. H. (13 DAYS)(400 HP)(0.2)	1040 CF
③ TRANSIT P.H. TO SITE (.5 DAY)(1500 HP)(0.2)	150 CF
④ SEA TRIALS & TRAINING (13 DAYS) (18800) $\left(\frac{.45}{54}\right)$ =	2037 CF
⑤ INSTALL ARRAYS (23 DAYS) (18800) $\left(\frac{.45}{54}\right)$ =	3604 CF
⑥ TRANSIT SITE TO PT. H. (.5 DAY)(1500 HP)(0.2)	150 CF
⑦ DEMOB @ PT. H. (12 DAYS)(400 HP)(0.2)	960 CF
⑧ WEEKENDS (12 W/E × 2 DAYS)(400 HP)(0.2)	1920 CF

⑨ CRANE DIESELS

AT PT.H. (2) @ 200HP EA - 10 HRS/DAY

(13 DAYS)(2 CRANES)(200 HP) $\left(\frac{10\ HRS}{DAY}\right)\left(\frac{.45}{54}\right)$

SEA TRIALS (13 DAYS)

IMPLANT ARRAYS (23 DAYS)

= (49 DAYS)(2 CRANES)(200 HP) $\left(\frac{10\ HRS}{DAY}\right)\left(\frac{.45}{54}\right)$ = 1634 CF

⑩ DIVERS BOATS (2) 650 HP/BOAT

SEA TRIALS 13 DAYS

IMPLANT ARRAYS 23 DAYS

WEEKENDS (DURING SEA TRIALS & OPNS)

7 × 2 DAYS × 50% = 7 DAYS

43 DAYS

(43 DAYS)(2 BOATS)(650 HP) $\left(\frac{10\ HRS}{DAY}\right)\left(\frac{.45}{54}\right)$ = 4660 CF

70% CAP = 16345 CF

100% CAP = 23350 CF

$\div 42.5 \frac{CF}{LT}$ = 550 LT

04072

5-16-78 NAVFAC . Scenario 3

YFNB

PROVISIONS

PAYROLL CREW

	PER DAY ST RATE	PER DAY OT RATE
(16)	1423	2403

87 DAYS @ $1423^{00}/DAY = 123,801

UCT (7)

AT PT H	13 DAYS
+ W/E	4 DAYS
DAYS 19-71	= 53 DAYS
AT PT H	12 DAYS
+ W/E	4 DAYS
	86 DAYS
+ GET READY	1
	87 DAYS @ 297 : 25,839

TRAVEL EXPENSE PROJECT NO UCT

29,486
2596
32,082.

(1) OPS DIRECTOR

PER DIEM · DAY (-1), 1-18 = 19 DAYS

W/E: 20-21, 27-28, 34-35, 41-42, 48-49

8x2=16 55-56, 62-63, 69-70, 71-89 = 35 DAYS 19

19

54 DAYS @ 35.00 : 1890.

AIRFARE: WASH DC TO LAX RD TRIP 414

MILEAGE: LAX TO PT H 180 MI @ .17 = 31

DAILY MILEAGE DAYS 1-18, = 18 + 33 : 51 DAYS @ 30 MI @ .17/MI : 261

2596

BAL OF PROJECT PEOPLE = (23)

PER DIEM: DAY 16-18 + W/E 8x2 DAYS, 72, 73 = 21 DAYS @ 35.00 : 735
3 16

AIRFARE WASH DC TO LAX RD TRIP 414

MILEAGE. LAX TO PT H 180 MI @ .17: 31

DAILY MILEAGE: DAYS 17, 18, + W/E 8x2 DAYS 71, 72, : 20 DAYS 30 MI .17/MI = 102
2 16 2

1282

$\boxed{23 \times 1282 = 29,486}$

APPENDIX T

CHARTER (LEASE) OPTION COSTS

MADE BY [illegible] GLOBAL MARINE DEVELOPMENT INC. W.O. No./A.F.E. No. 04072

CHECKED BY ______ ESTIMATE SHEET SHEETS 4 SHEET NO. 1

DATE ~~4-24-78~~ 5-4-78 TITLE NAVFAC: SCENARIO 1

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
1. LEASE SUPPLY VESSEL 194' x 40' BM	112 DAYS / 25 DAYS	@	4000/DAY / 3000/DAY } =		523,000	TIDEWATER
2. LEASE BARGE 130' x 30' BM	5 MOS	@	7000/MO =		35,000	JONES T&B.
3. LEASE THRUSTER - PORTABLE 500 HP					76,000	N. JOFFE
4. LEASE 30' ALUM. HULL DIVER'S BOAT	137 DAYS	@	200/DAY =		27,400	BRANDENBURGER
5. LEASE 250 HP DIESEL GENERATOR	4 MONTHS	@	2851/MO =		11,404	ENG & EQUIPT
OCE INVENTORY ITEMS TO BE FURNISHED BY NAVFAC:						
(2) PENGO WINCHES				—	—	
(1) POWERED CABLE REEL				—	—	
(1) CAMERA SLED & TV SYSTEM				—	—	
(3) CABLE REELS W/EM CABLE				—	—	
(1) 30 TON MOBILE CRANE				—	—	
(1) 35 TON MOBILE GROVE CRANE				—	—	
(1) RS-7 ACOUSTIC POS. IND. SYST.				—	—	
(1) CONSTRUCTION SUPPORT VAN				—	—	
(1) INSTRUMENTATION VAN				—	—	
(1) AIR COMPRESSOR				—	—	
SHIPYARD PREPARATION PRIOR TO MOBILIZATION AT PORT HUENEME:						
ON WORKBOAT:						
FAB & INSTALL THRUSTER SUPPORT PLATFORM				250	1,500	
INSTALL THRUSTER				24	50	
INSTALL CONTROLS FROM THRUSTER TO CONTROL CENTER				160	1,500	
INSTALL & TEST OCE FURNISHED RS-7 ACOUSTIC POSITION IND. SYSTEM				100	300	
FAB & INSTALL PAD-EYES & OTHER TIE-DOWN HARDWARE				500	1,200	
FAB & INSTALL THRUSTER DAY TANK -	INCL. PIPING & CONTROLS			150	825	
ON BARGE:						
FURNISH & INSTALL "PORTAHOUSE" OR ELDER PORTABLE HOUSING PROVIDE FOR (30) ADDL PEOPLE - 4 MAN - MODULES. HEAD-SHOWERS-WASH BASINS - FURNISHINGS -	WILL MEET U.S. NAVY REQUIREMENTS - WILL NOT MEET U.S.C.G. REQ'MTS.					

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CHECKED BY ______ ESTIMATE SHEET SHEETS 4 SHEET NO. 2

DATE ~~4-24-78~~ 5-4-78 TITLE NAVFAC - SCENARIO 1

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
(PORTABLE HOUSING CONT'D)						
STORAGE (30 DAYS) POTABLE WATER	LEASE: MINIMUM					
" " WASH WATER	11 MONTHS					
HOLDING TANK (30 DAYS) HUMAN WASTE		@	6500		71,500	L
GALLEY & MESS FOR 30 PEOPLE -	FREIGHT					
SEAT 20/MEAL	DALLAS	TO	LA		10,500	L
CLOTHES WASHER & DRYER	LA	TO	DALLAS		10,500	L
POWER REQUIRED = 250 HP 119 DAYS	SELLING PRICE: 150 000 + FRT TO LA 10,500 = 160,500					
AIR CONDITIONING/HEAT						
DUCT WORK						L
LEASE (3) BAKER TANKS-MOBILE 21000 GALS (500 BBL) EA		4 MONTHS			9615	R.J. BAKER
PROVIDE PIPING & CONNECTING WIRING FOR HOUSING				330	4350	
ERECTION OF PORTABLE HOUSING ON BARGE				780	1560	
AT PORT HUENEME:						
LOAD & SECURE ALL OCE INV. ITEMS ABOARD SUPPLY BOAT & BARGE				—	1,000	
PROVISIONS						
20 PEOPLE 63 DAYS @ 8.50/MAN/DAY =	10,710					
50 PEOPLE 54 " @ " " " =	22,950					
					33,660	
FUEL DIESEL #2 @ 106¢/LT (119 DAYS) WORKBOAT, THRUSTER, CRANE DIESELS, PORTABLE DIESEL GENERATOR ON BARGE	1545	LT			163,770	
LUBE OIL 123 DAYS @ 7.50/DAY					923	
GENERAL CONSUMABLES 137 DAYS @ 25.00/DAY					3,425	

CREW COST: INCLUDED IN DAY RATE
AV = $2000/MAN/MONTH
18 MEN x 5 MOS x 2000 = $180,000.

MADE BY DBL GLOBAL MARINE DEVELOPMENT INC. W.O. No./A.F.E. No. 04072

CHECKED BY ESTIMATE SHEET SHEETS 4 SHEET NO. 3

DATE ~~4-24-78~~ 5-4-78 TITLE NAVFAC - SCENARIO 1

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
DEMOBILIZATION:					
OFFLOAD ALL OCE INVENTORY ITEMS AT PORT HUENEME				—	—
OFFLOAD ALL LEASED AND/OR NON-OCE ITEMS AT SHIPYARD					
REMOVE THRUSTER PLATFORM & REPAIR CHANGES				50	50
REMOVE THRUSTER CONTROLS & REPAIR				100	600
REMOVE RS-7 & REPAIR				150	700
REMOVE PAD EYES & REPAIR				300	300
REMOVE PORTABLE HOUSING FROM BARGE				400	400
ON CHARTER SURVEY					500
OFF CHARTER SURVEY					500
REFUEL				—	—
WORKBOAT RETURN TO OWNER'S DOCK				—	—
BARGE RETURN TO OWNER'S DOCK				—	—
SHIP PORTABLE HOUSING TO OWNER				—	—
SUB TOTALS				3,294	992,032
S/Y SERVICES 16%				527	
				3,821	

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CHECKED BY
DATE ~~4-28-78~~ 5-4-78

GLOBAL MARINE DEVELOPMENT INC.
ESTIMATE SHEET
TITLE NAVFAC - SCENARIO I

W.O. No./A.F.E. No. 04072
SHEETS 4 SHEET NO. 4

DESCRIPTION	UNITS L	UNITS M	LABOR	MAT'L	EXT.
S/Y					
LABOR 3,821 HOURS @ 25.00/HR =					95,525.
MATERIAL COST (GMDI)					217,113.
HANDLING @ 15%					—
LEASE & RENTAL COSTS					774,919.
		~~ODC~~			
SUB TOTAL					
S/Y ENGINEERING 200 HRS @ 21.50					4,300
* GMDI ENGINEERING 500 HRS @ 20.71					10,355
* GMDI CONSTRUCTION SUPERVISION 352 HRS @ 21.76					7,660
ODC:					
HOTEL, SUBSISTENCE, MILEAGE					1,633,
SUB TOTAL					
ALLOWANCE FOR REPAIR COST AFTER DEMOBILIZATION					25,000
	TOTAL MAT'L, LEASE, LABOR & OH, REPAIR COST				1,136,505
TOTAL LEASE COST	G&A @ 10% =				113,651
				ST.	1,250,156.
	FEE @ 10% =				125,016.
				TOTAL	1,375,172.
ADD TRAVEL EXPENSE:					
PROJECT PERSONNEL 36,616					
UCT PERSONNEL 3,605					
TOTAL			NO G&A ON FEE		40,221.
TOTAL					1,415,393.

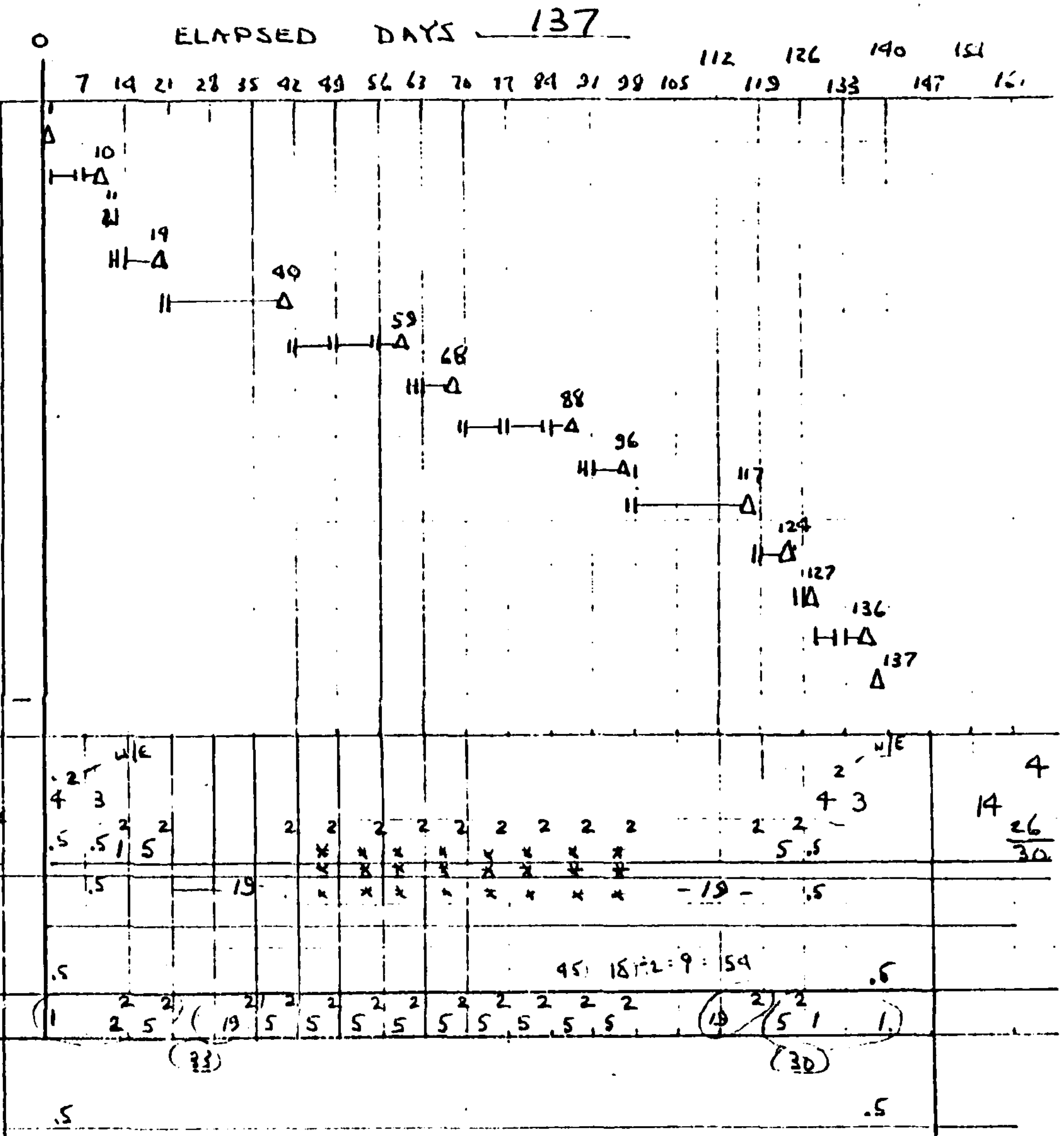
* GMDI LABOR (LABOR AND OVERHEAD)
ENGRG: 11.83/HR + 75% OH = 20.71/HR
CONSTRUCTION SUPERVISION, INSPECTION & ESTIMATING: 12.43/HR + 75% OH = 21.76/HR

NAVFAC - Scenario 1 - Schedule

Work Boat	194' x 40'
Barge	130' x 30'

Scenario 1 (Schedule)

Activity	Work Days
Transit to S/Y	1
Rig for Retrieve & Redeploy	7
Transit S/Y to Port Hueneme	1
Add equipt. at Pt. H.	6
Transit Pt. H. to Pt Allen Kawaii	19
Sea Trials	13
Retrieve (5) old arrays	7
Deploy (9) new arrays	14
Relocate (4) SW arrays	6
Transit Pt. A. to Pt. H.	19
Remove equipt at Pt. H.	5
Transit P.H. to S/Y	1
De-rig	7
Transit from S/Y.	1
	107



HP usage
-0-
400
1000
3000
3900
5750
Food

Using 218' x 43' work boat.
Omit 5750 HP
Add 3900 HP

5-4-78

DBS

04072

~~4-27-78~~
5-4-78

NAVFAC - SCENARIO 1

FUEL

WORKBOAT

194' x 40'	1210 LT
THRUSTER	60 LT
BARGE HOTEL REQMTS	90 LT
CRANE DIESELS	90 LT
	~~45~~
DIVERS BOAT	95 LT
	1545 LT

Σ LEASE COST WAS 1165888
NOW 1177469
FUEL = +11581

1ST ST WAS 1,108 543
NOW 1120 124
2ND ST WAS 1140 888
NOW 1152 469

WAS
1450 LT 153 700

NOW - 1545 LT 163 770

$\boxed{= + 10,070}$ + 11,581

SHT 3 TOTAL WAS 981,962
NOW 992 032

MATL COST WAS 207 043
NOW 217 113

M/H WAS 31,056
NOW 32567

0788 04072

4-27-78

NAV-FAC Scenario 1

Fuel

= 0.2

① Transit to S/Y

7 $\left[(.5 \text{ DAYS})(5750 \text{ HP}) + (.5 \text{ DAYS})(-0-\text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right) \times \frac{.45}{54} =$ 575 cu FT $\frac{184'}{218}$

7 Rig

390 cu FT

② Transit to Pt. H.

1 $\left[(.5 \text{ DAYS})(3000 \text{ HP}) + (.5 \text{ DAYS})(400 \text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right) \times \frac{.45}{54} =$ 340 cu FT

③ At Pt. H.

5 $\left[(5 \text{ DAYS})(400 \text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right)$ = 400 cu FT

④ Transit to Pt Allen

19 $\left[(19 \text{ DAYS})(3000 \text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\frac{.45}{54}\Big]$ = 11,400 cu FT

24,800 HP·HRS/DAY

⑤ Sea Trials

13 $(13 \text{ DAYS})\left(\left[3000 \text{ HP}\left(\frac{4 \text{ HRS}}{\text{DAY}}\right)\right] + \left[1000 \text{ HP}\left(\frac{8 \text{ HRS}}{\text{DAY}}\right)\right] + \left[400 \text{ HP}\frac{12 \text{ HRS}}{\text{DAY}}\right]\right)\frac{.45}{54}$

= 2687 cu FT

⑥ Retrieve - Deploy & Relocate Arrays 24,800

28 $(28 \text{ DAYS})\left(\left[3000 \text{ HP}\left(\frac{4 \text{ HRS}}{\text{DAY}}\right)\right] + \left[1000 \text{ HP}\left(\frac{8 \text{ HRS}}{\text{DAY}}\right)\right] + \left[400 \text{ HP}\left(\frac{12 \text{ HRS}}{\text{DAY}}\right)\right]\right)\frac{.45}{54}$

= 5,787 cu FT

⑦ Transit Pt. A to Pt H

19 $\left[(19 \text{ DAYS})(3000 \text{ HP})\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right)\right]$ = 11,400 cu FT

⑧ Remove Equipt at Pt. H.

5 $\left[(5 \text{ DAYS})(400 \text{ HP})\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right)\right]$ = 400 cu FT

⑨ Transit Pt. H to S/Y.

1 Same as ② = 340 cu FT

7 ⑩ De-Rig = -0- cu FT

1 ⑪ Transit from S/Y

107 Same as ① = 575 cu FT

Subtotal 33,904

⑫ Weekends (except in Transit)

30 $\left[(4 \text{ DAYS})(-0-\text{ HP}) + (26 \text{ DAYS})(400 \text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\frac{.45}{54}$ = 2080 cu FT

137 Total 35984 .075

Deduct 370 51410 .012

530 216'

$= \div 42.5 = 1210$ L 1,210 LT Diesel

T-7

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CHECKED BY ______ ESTIMATE SHEET SHEETS ____ SHEET NO. ____

DATE 5-4-78 TITLE NAVFAC - SCENARIO 1

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
FUEL - (CONT'D)					
DIVER'S BOAT					
TWIN G.M. D671 DIESELS					
@ 325 HP/ENGINE = 650 HP/BOAT					
SEA TRIALS & TRAINING	13 DAYS				
RETRIEVE & REDEPLOY ARRAYS	28 DAYS				
WEEKENDS 9 x 2 DAYS x 50% =	9 DAYS				
	50 DAYS				
$(50\text{ DAYS})(650\text{HP})\frac{10\text{ HRS}}{\text{DAY}}\left(\frac{.45}{54}\right) =$	2710	CU FT	@	70% CAP.	
	3875	CU FT	@	100% CAP.	
$\div 42.5 \frac{\text{CU FT}}{\text{LT}} =$			95	LT	

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CHECKED BY ____ ESTIMATE SHEET SHEETS ____ SHEET NO. ____

DATE 4-27-78 TITLE NAV FAC : SCENARIO)

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
FUEL:					
WORKBOAT 194' x 40' CONT HP = 5750					
(1) TRANSIT TO S/Y 120 mi @ 12 Knots	5750 HP				
~~12 HRS -0- HP~~ ALLOW 5750 HP	12 HOURS	1 DAY			
(2) TRANSIT TO PT. HUENEME					
TOWING BARGE - 3000 HP	12 HRS				
120 mi @ 10 KNOTS					
12 HRS @ 400 HP	12 HRS	1			
(3) ADD EQUIPMENT AT PT. H.					
400 HP 24 HRS/DAY	5 DAYS				
(4) TRANSIT PT. H. TO PT. ALLEN KAUAI				3200 / 11 =	300 HRS
3200 MI @ 10 KNOTS =					
TOWING BARGE - 3000 HP	19 DAYS	CONTING. =		+50%	150 HRS
					450 HRS ÷ 24
				=	19 DAYS
(5) SEA TRIALS - 12 HRS/DAY.	13 DAYS				
4 HRS DAY @ 3000 HP					
8 HRS DAY @ 1000 HP					
12 HRS DAY @ 400 HP					
(6) RETRIEVE - DEPLOY & RELOCATE ARRAYS	8 / 14 / 6				
4 HRS/DAY @ 3000 HP					
8 HRS/DAY @ 1000 HP	28 DAYS				
12 HRS/DAY @ 400 HP					
(7) TRANSIT PT. A. TO PT. H.					
3200 MI @ 10 KNOTS . 3000 HP	19 DAYS				
(8) REMOVE EQUIPMENT AT PT. H.					
400 HP	5 DAYS				
(9) TRANSIT PT. H TO S/Y.					
3000 HP	12 HRS				
400 HP	12 HRS				
(10) DE-RIG -0- HP.	...				
(11) TRANSIT FROM S/Y 5750 HP	12 HRS				

D38.

4-28-78 NAVFAC

BAKER TANKS FOR:

1. HOLDING TANK - HUMAN WASTE 40 GALS/MAN/DAY
2. STORAGE TANK - POTABLE WATER 20 GALS/MAN/DAY
3. " " WASH WATER 20 GALS/MAN/DAY

MAXIMUM CAPACITY = 500 Bbl @ 42 GAL/Bbl = 21,000 GAL

HUMAN WASTE: 8 FLUSHES/DAY × 5 GAL/FLUSH/MAN = 40 GAL/DAY/MAN

ALLOW FOR 50 MAN CAPACITY =

50 × 40 = 2000 GAL/DAY

21,000 GAL ÷ 2000 GAL/DAY = 10.5 DAYS.

CONCLUSION:

→ A WITH ONE TANK, RETURN TO PORT AND EMPTY HOLDING TANK EACH WEEKEND.

B OR, PROVIDE 3 TANKS & EMPTY EVERY 30 DAYS

POTABLE WATER

20 GALS/MAN/DAY × 50 MEN = 1000 GAL/DAY

21 000 GAL ÷ 1000 GAL/DAY = ENOUGH FOR 21 DAYS

CONCLUSION: ADD 7000 GALLONS EACH WEEKEND.

WASH WATER

ADD 7000 GALLONS EACH WEEKEND.

LEASE RATES (COAST GUARD APPROVED) ₽

R. J. BAKER (BAKER TANKS)

JOE (213) 436-6251

1ST 30 DAYS: 31^{50}/DAY

THEREAFTER: 22^{00}/DAY OR 660^{00}/MO

TRANSPORT COST: 33^{00}/HR 4 HOUR MINIMUM

WILL NEED PAD EYES & CHOCKS TO TIE DOWN

MOVE TO S/Y 4 HRS @ 33^{00}/HR =	132.–
RENT 1ST MO 31 DAYS @ 31^{00}/DAY =	961.–
RENT 3 ADDL MO @ 660/MO =	1980.–
RET FR S/Y 4 HRS @ 33^{00}/HR =	132.–
3 TANKS @	3205.– =

SCENARIO 1

9615.00

~~SCENARIO 3~~

		132.–
		961.–
5 DAYS		10.–
2 MO	2 MO	1320
		132
		2555
3 TANKS =		7965

SCENARIO 2

132
961
1320
132
2545
3 TANKS = 7635.

R. J. BAKER   436-6251

HOLDING   Joe   60 000
45 000

LARGEST   500 BBL - 21000 G   12' HI 35' L x 8' WIDE
BASE 19'

EMPTY WT 9 TON

3/16" STEEL PLATE
NOT COATED INSIDE

FRESHWATER CONSUMPTION -

CG APPROVED

WASH WATER

500 BBL

EMPTY WT
9 TON

13^{50}/DAY 1ST 30 DAYS
then 315^{00}/MO OR 10.50/DAY

CG - 31^{00}/DAY 1ST 30
660^{00}/MO 22^{00}/DAY

12 TON

33^{00}/HR - 4 HR/MIN

ORL 04072

5-9-78 Scenario 1

Lease

ADD TRAVEL EXPENSE FOR PROJECT PERSONNEL & UCT PERSONNEL:

PROJECT PERSONNEL: $

OPS DIRECTOR (DAY 1 THRU DAY 19) PER DIEM 19 x 35.00 = 665-
AIRFARE - WASH DC TO LAX ROUNDTRIP 414-
MILEAGE LAX TO PT HUENEME - - 180 MI @ .17/MI: 31-
DAILY MILEAGE: 30 MI x 19 DAYS @ .17/MI = 97-
AIRFARE WASH DC TO LAX ROUNDTRIP 414-
LAX TO HONOLULU - - 300-
HONOLULU TO PT ALLEN - - 44-
PER DIEM: DAYS 40-41-42, 48-49, 55-56, 62-63,
69-70, 76-77, 83-84, 89-90, 97-98 19 x 35- : 665-
PER DIEM: DAYS 117 THRU 137 : 21 DAYS @ 35- = 735-
DAILY MILEAGE: 21 DAY x 30 MI @ .17/MI = 108-
AIRFARE WASH DC TO LAX - RD TRIP 414-
3,887-

BALANCE OF PROJECT TEAM: (23 PEOPLE)
AIRFARE WASH DC TO LAX RD TRIP 414-
LAX TO HONOLULU - - 300-
HONOLULU TO PT ALLEN - - 44-
PER DIEM (DAY 40 THRU 97):
DAYS 40-41-42, 48-49, 55-56,
62-63, 69-70, 76-77, 83-84,
90-91, 96-97 : 19 DAYS @ 35- : 665-
1423- x 23 = 32,729-
TOTAL PROJECT PERSONNEL $ 36,616-

UCT PERSONNEL: (7 PEOPLE)
MILEAGE: PT. HUENEME TO LAX RD TRIP 31-
AIRFARE LAX TO HONOLULU - - 300-
HONOLULU TO PT ALLEN - - 44-
PER DIEM: DAYS 40-41 & 97-98 (4) @ 35- : 140-
515- x 7 = 3,605-

TOTAL $ 40,221.-

MADE BY [signature] **GLOBAL MARINE DEVELOPMENT INC.** W.O. No./A.F.E. No. 04072

CHECKED BY ________ **ESTIMATE SHEET** SHEETS 2 SHEET NO. 1

DATE 5-4-78 TITLE NAVFAC: SCENARIO 2

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
LEASE SUPPLY VESSEL 194' x 40' BM	36 DAYS 7 DAYS	@ @	4000/DAY 3000/DAY		165,000 L
OCE INVENTORY ITEMS TO BE FURNISHED BY NAVFAC:					
(2) POWERED CABLE STOWAGE REELS				—	—
TENSION DYNAMOMETERS				—	—
SHIPYARD PREPARATION PRIOR TO MOBILIZATION AT PORT HUENEME:					
ON WORKING PLATFORM:					
FAB & INSTALL PAD-EYES & OTHER TIE DOWN HARDWARE				150	450
AT PORT HUENEME:					
LOAD & SECURE ALL OCE INV. ITEMS ABOARD WORKING PLATFORM					100
PROVISIONS					
20 PEOPLE 31 DAYS @ 8^{50}/MAN/DAY =					5,270
FUEL WORKING PLATFORM	307	LT @	106^{00}/LT		32,542
LUBE OIL 36 DAYS @ 7^{50}/DAY =					270
GENERAL CONSUMABLES 43 DAYS @ 25^{00}/DAY =					1,075
DEMOBILIZATION:					
OFFLOAD ALL OCE INV. ITEMS AT P.H.				—	—
AT SHIPYARD: REMOVE PAD-EYES & REPAIR				150	150
ON CHARTER SURVEY					500
OFF CHARTER SURVEY					500
REFUEL & RETURN VESSEL TO OWNER'S DOCK				—	—
SUBTOTALS				300	205,857
S/Y SERVICES @ 16%				48	—
TOTALS				348	205,857

MADE BY: DRL

CHECKED BY:

DATE: 5-5-78

GLOBAL MARINE DEVELOPMENT INC.

ESTIMATE SHEET

TITLE: NAVFAC : SCENARIO 2

W.O. No./A.F.E. No. 04072

SHEETS 2 SHEET NO. 2

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	EXT.
LABOR: 348 HOURS @ 25.00/HR =	8,700					8,700
MATERIAL COST (GMDI)	40,857					40,857
MATERIAL HANDLING @ 15% =	6,129					—
LEASE & RENTAL COSTS	165,000					165,000
SUB TOTAL	220,686					
S/Y ENGINEERING 50 HRS @ 21.00/HR =	1,050					1,050.
GMDI ENGINEERING 100 HRS @ ~~31.00~~ 20.71/HR =	2,071					2,071.
GMDI CONSTRUCTION SUPERVISION 172 HRS @ ~~31.00~~ 21.76/HR =	3,743					3,743.
ODC:						
HOTEL, SUBSISTENCE, MILEAGE	601					601.
SUB TOTAL	228,151					
ALLOWANCE FOR REPAIR COST AFTER DEMOBILIZATION	10,000					10,000.
		TOTAL MATERIAL, LEASE LABOR (OH), REPAIR				232,022
TOTAL LEASE COST =	238,151	G&A @ 10% =				23,202.
					S.T.	255,224.
ADD TRAVEL EXPENSE		FEE @ 10%				25,522
PROJECT PERSONNEL	8,169	TOTAL				280,746.
						8,169.
TOTAL	246,320					288,915.

Scenario 2 Schedule

ELAPSED DAYS 43

Activity	Work Days	Elapsed day (end)
Transit to S/Y	1	1
Rig for Setting Moor	4	5
Transit S/Y to Port Hueneme	1	8
Load & Secure OCE items at P.H.	3	11
Transit P.H. to San Diego	1	12
Training & Sea Trials	5	19
Tow SQUAW to moor site	1/2	22
Moor SQUAW	7	30
Transit to San Diego	1/2	31
Transit to Port Hueneme	1	32
Offload OEC items at P.H.	2	36
Transit P.H. to S/Y.	1	37
De-Rig	3	40
Transit from S/Y.	1	43
Σ =	31	

Elapsed day scale: 0, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161

HP usage	0–7	7–14	14–21	21–28	28–35	35–42	42–49
-0-	4.5 [2]					3 [2]	
400		1+3	*	*	* 1	1	
1000			*	*	*		
3000		1	*	.5*	* 1	1	
5750	.5						.5
Food, allow for 20	1+4	1+4	5	8	1	2	1

Full Time 27

+ W/E
4 × 2 × .5 : 4

31 days

Lube oil
43 - (4+3) : 36 days

NAV FAC - Scenario 2 - Schedule

04072

5-4-78

~~4-27-78~~ 5-4-78

G 4072

NAV-FAC SCENARIO 2

$\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45 \frac{\text{LB}}{\text{HP-HR}}}{54 \frac{\text{LB}}{\text{CU FT}}}\right) = (0.2) \frac{\text{CU FT}}{\text{HP DAY}}$

FUEL USAGE

① TRANSIT TO S/Y. 1 ✓ $[(.5 \text{ DAYS})(5750 \text{ HP}) + (.5 \text{ DAYS})(-0- \text{ HP})]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right)$	=	575
② RIG FOR SETTING MOOR $(~~8~~\,4 \text{ DAYS})(-0- \text{ HP})$	=	-0-
③ TRANSIT S/Y TO PORT HUENEME (WORK BOAT ONLY; ~~BARGE @ S/Y~~) 1 $[(.5 \text{ DAYS})(5750 \text{ HP}) + (.5 \text{ DAYS})(400 \text{ HP})](0.2 \frac{\text{CU FT}}{\text{HP DAY}})$	=	615
④ LOAD & SECURE EQUIPT. @ P.H. ~~6 4~~ $[(~~6~~\,3 \text{ DAYS})(400 \text{ HP})](0.2 \text{ CU FT/HP DAY})$	=	240 ~~480~~
⑤ TRANSIT P.H. TO ~~S/Y~~ SAN DIEGO 1 ✓ $[(.5 \text{ DAY})(5750 \text{ HP}) + (.5 \text{ DAY})(400 \text{ HP})](0.2 \text{ CU FT/HP DAY})$	=	615
~~⑥ ...~~	=	~~340~~
⑦ TRAINING & SEA TRIALS ~~10~~ 5 $(~~10~~\,5 \text{ DAYS})[(4 \text{ HRS/DAY})(~~3000~~\,5750 \text{ HP}) + (8 \text{ HRS/DAY})(1000 \text{ HP}) + (12 \text{ HRS/DAY})(400 \text{ HP})]\left(\frac{.45}{54}\right)$	=	1492 ~~2067~~
⑧ TOW SQUAW TO MOOR LOCATION .5 ✓ $[(.5 \text{ DAY})(3000 \text{ HP})](0.2 \text{ CU FT/DAY})$	=	300
⑨ MOOR SQUAW 7+4 $(7 \text{ DAYS})[(4 \text{ HRS/DAY})(~~3000~~\,5750 \text{ HP}) + (8 \text{ HRS/DAY})(1000 \text{ HP}) + (12 \text{ HRS/DAY})(400 \text{ HP})]\left(\frac{.45}{54}\right)$	=	2090 ~~1447~~
⑩ TRANSIT TO SAN DIEGO .5 $[(.5 \text{ DAY})(~~3000~~\,5750 \text{ HP}) + (.5 \text{ DAY})(400 \text{ HP})](0.2 \text{ CU FT/HP DAY})$	=	615 ~~340~~
⑪ TRANSIT SAN DIEGO TO ~~S/Y~~ PORT HUENEME 1 ✓ $[(.5 \text{ DAY})(~~3000~~\,5750 \text{ HP}) + (.5 \text{ DAY})(400 \text{ HP})](0.2 \text{ CU FT/HP DAY})$	=	615 ~~340~~
~~⑫ ...~~ 1	=	~~615~~
⑬ OFFLOAD OEC EQUIPT @ P.H. ~~5+2~~ $(~~5~~\,2 \text{ DAYS})[400 \text{ HP}](0.2 \text{ CU FT/HP DAY})$	=	160 ~~400~~
⑭ TRANSIT P.H. TO S/Y 1 ✓ $(.5 \text{ DAY})(5750 \text{ HP})(0.2 \text{ CU FT/HP DAY})$	=	575
⑮ DE-RIG $3(4 \text{ DAYS})(-0- \text{ HP})$	=	-0-
⑯ TRANSIT FROM S/Y 1 $(.5 \text{ DAY})(5750 \text{ HP})(0.2 \text{ CU FT/HP DAY})$	=	575
SUB TOTAL		8467 ~~9,221~~
WEEKENDS $[(2)(2 \text{ DAYS})(-0- \text{ HP}) + (~~8~~\,4)(2 \text{ DAYS})(400 \text{ HP})](0.2 \text{ CU FT/HP DAY})$	=	640 ~~1,120~~
		9107 ~~10,341~~

DBB 04072

5-1-78 NAV-FAC SCENARIO 2

FUEL USAGE (CONTD.)

~~THRUSTER FUEL~~

~~IN USE FOR TRAINING & SEA TRIALS, & FOR MOORING.~~

~~TRAINING & SEA TRIALS~~	~~10 DAYS~~	
~~MOORING~~	~~7 DAYS~~	
	~~17 DAYS~~	

~~$(17\text{ DAYS})(500\text{ HP})\left(\frac{10\text{ HRS}}{\text{DAY}}\right)\left(\frac{0.45}{54}\right) =$~~ ~~709 CU FT @ 70% CAP~~
~~1012 CU FT @ 100% CAP.~~

~~24 LT OF FUEL~~

~~BARGE HOTEL REQUIREMENTS~~

~~TRAINING & SEA TRIALS~~	~~10 DAYS~~	
~~TOW SQUAW TO LOCATION~~	~~.5 DAY~~	
~~MOOR SQUAW~~	~~7 DAYS~~	~~18 DAYS~~
~~TRANSIT TO SAN DIEGO~~	~~.5 DAY~~	
~~50% OF ABOVE WEEKENDS~~	~~(.5)x(4)x(2 DAYS) =~~	~~4 DAYS~~
		~~22 DAYS~~

~~$(22\text{ DAYS})(250\text{ HP})\left(\frac{24\text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{.54}\right) =$~~ ~~1100 CU FT @ 70% CAP~~
~~1572 CU FT @ 100% CAP~~

~~37 LT OF FUEL~~

~~CRANE DIESELS~~ ~~37 LT OF FUEL~~

WORKBOAT

9107 ~~10,404~~ CU FT @ 70% CAP
13,010 ~~14,863~~ CU FT @ 100% CAP

$\div$ 42.5 CU FT/LT = 307 ~~350~~ LT OF FUEL

SUMMARY

WORKBOAT	~~350 LT~~ 307	~~350~~ LT
~~THRUSTER~~	~~60 LT~~	~~24~~ LT
~~BARGE HOTEL~~	~~3~~	~~37~~ LT
~~CRANE DIESELS~~		~~37~~ LT

307 ~~448~~ LT OF FUEL @ 106$/LT

= $32,542. ~~47,488~~

DBK

04072

5-4-78

NAVFAC - SCENARIO 2

PROVISIONS

20 PEOPLE ~~24~~ 31 DAYS @ 8.50/MAN/DAY = ~~4080.~~ 5,270.

~~50 " 26 " @~~ = ~~11,050.~~

~~15,130.~~

LUBE OIL

36 ~~55~~ DAYS @ 7.50/DAY = ~~413.~~ 270.

GENERAL CONSUMABLES

43 ~~66~~ DAYS @ 25.00/DAY = ~~1,650.~~ 1,075.

DBE 04072

5-9-78 SCENARIO 2

LEASE

ADD TRAVEL EXPENSE FOR PROJECT PERSONNEL:

PROJECT PERSONNEL

OPS DIRECTOR (DAY 1 THRU 32)

PER DIEM: DAYS 1,2,3,4,5,6,7,8,9,10,11,12,13,14
20,21, 27,28, 34,35,36
21 DAYS @ 35– = 735–

AIRFARE - WASH DC TO LAX RD TRIP 414–

MILEAGE: LAX TO S/H
DAILY 1,2,3,4,5,35,36 @ 30 mi = 210 mi
TO PCH. 180 mi
S.D. 16 mi
406 mi @ .17 = 70–

1,219–

BALANCE OF PROJECT TEAM: (10 PEOPLE)

PER DIEM: DAYS 12, 13-14, 20-21, 27-28, 31
8 DAYS @ 35–/DAY = 280–

AIRFARE - WASH DC TO SAN DIEGO RD TRIP 412–

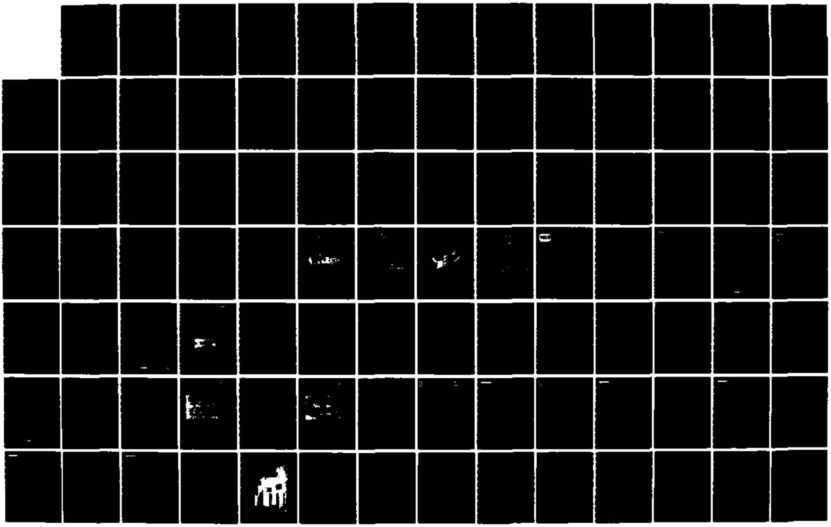
MILEAGE - 16 mi @ .17 = 3–

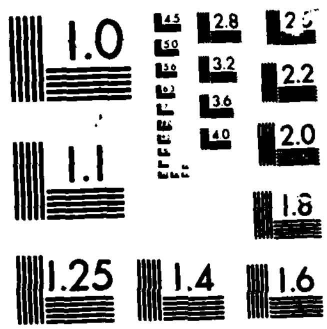
695 x 10 = 6,950–

TOTAL $ 8,169–

AD-A165 727 WEST COAST OCEAN CONSTRUCTION PLATFORM PRELIMINARY DESIGN STUDY VOLUME 2..(U) GLOBAL MARINE DEVELOPMENT INC NEWPORT BEACH CA JUL 78 GMDI-040072-001-VOL-2 5/6

UNCLASSIFIED CHES/NAVFAC-FPO-1-78-9-PT-2 F/G 13/10 NL





MICROCOPY RESOLUTION TEST CHART

MADE BY DBS — **GLOBAL MARINE DEVELOPMENT INC.** — W.O. No./A.F.E. No. 04072

CHECKED BY ______ — **ESTIMATE SHEET** — SHEETS 3 SHEET NO. 1

DATE 5-2-78 — TITLE NAVFAC - SCENARIO 3

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
DOES NOT INCLUDE SITE SURVEY PHASE.					
LEASE SUPPLY VESSEL 194' x 40' Bm	67 DAYS 28 DAYS	@ @	4000/DAY 2000/DAY	=	352,000 L
LEASE BARGE 130' x 30' Bm	4 MOS	@	7000/MO	=	28,000 L
LEASE THRUSTER - PORTABLE 500 HP					76,000 L
LEASE 30' ALUM. HULL DIVER'S BOAT (650 HP)	95 DAYS	@	200^{00}/DAY	=	19,000 L
LEASE 37' – – – – (650 HP)	95 DAYS	@	250^{00}/DAY	=	23,750 L
LEASE 250 HP DIESEL GENERATOR	3 MONTHS	@	2851/MO	=	8,553 L
LEASE (3) BAKER TANKS (500 Bbl ea)	95 DAYS MONTHS	@	–	=	7,965 L
OCE INVENTORY ITEMS TO BE FURNISHED BY NAVFAC:					
(2) FENCO WINCHES				—	—
(2) POWERED CABLE REELS				—	—
(1) CAMERA SLED & TV SYSTEM				—	—
(3) CABLE REELS W/EM CABLE				—	—
(1) 30 TON MOBILE CRANE				—	—
(1) 35 TON MOBILE GROVE CRANE				—	—
(1) RS-7 ACOUSTIC POS. IND. SYST.				—	—
(1) AIR COMPRESSOR & HOSE				—	—
SHIPYARD PREPARATION PRIOR TO MOBILIZATION AT PORT HUENEME:					
ON WORKBOAT:					
FAB & INSTALL THRUSTER SUPPORT PLATFORM				250	1,500
INSTALL THRUSTER				24	50
INSTALL THRUSTER CONTROLS				160	1,500
INSTALL & TEST OCE FURN RS-7 ACOUSTIC POS. IND. SYSTEM				100	300
FAB & INSTALL PAD-EYES & OTHER TIE-DOWN HARDWARE				600	1400
FAB & INSTALL THRUSTER DAY TANK INCL. PIPING & CONTROLS	4250#			150	825
FAB & INSTALL A-FRAME ON EA DIVERS BOAT	2	400	3200	800	6400

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CHECKED BY ESTIMATE SHEET SHEETS 3 SHEET NO. 2

DATE 5-3-76 TITLE NAVFAC - SCENARIO 3

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	
SHIPYARD PREP (CONT'D.)						
ON BARGE: (20 PEOPLE)						
FURNISH & INSTALL PORTABLE HOUSING	(MINIMUM	11 MONTHS)			77,620	L
PROVIDE PIPING & CONNECTING WIRING FOR HOUSING				294	4,150	
ERECT PORTABLE HOUSING ON BARGE				650	1,300	
AT PORT HUENEME:						
LOAD & SECURE ALL OCE INV. ITEMS ABOARD SUPPLY BOAT & BARGE				—	1,000	*
PROVISIONS						
77 20 PEOPLE 30 DAYS @ 8^{50}/MAN/DAY =	5,100					
56 40 PEOPLE 47 DAYS @ 8^{50}/MAN/DAY =	15980					
					21,080	
FUEL DIESEL #2	795	LT @	106/LT =		84,270	
LUBE OIL 77 DAYS @ 7.50/DAY =					578	
GENERAL CONSUMABLES 95 DAYS @ 25/DAY =					2,375	
DEMOBILIZATION:						
OFFLOAD ALL OCE INV. ITEMS AT P.H.				—	—	
OFFLOAD ALL NON-OCE ITEMS AT S/Y						
REMOVE THRUSTER PLATF. & REPAIR CHANGES				50	50	
REMOVE THRUSTER CONTROLS & REPAIR				100	600	
REMOVE RS-7 AND REPAIR				150	700	
REMOVE PADEYES & REPAIR SHIP & BARGE				300	300	*
REMOVE "A"-FRAMES FROM DIVERS' BOATS				100	200	
REMOVE PORTABLE HOUSING FROM BARGE & SHIP TO OWNER				400	400	
ON CHARTER SURVEY					500	*
OFF CHARTER SURVEY					500	*
REFUEL WORKBOAT & RETURN TO OWNER				—	—	
RETURN BARGE & DIVERS' BOATS TO OWNERS				—	—	
SUBTOTALS				4,128	722,866	
S/Y SERVICES @ 16% =				660	—	
TOTALS				4,788.	722,866	

MADE BY DBS **GLOBAL MARINE DEVELOPMENT INC.** W.O. No./A.F.E. No. 04072

CHECKED BY ______ ESTIMATE SHEET SHEETS 3 SHEET NO. 3

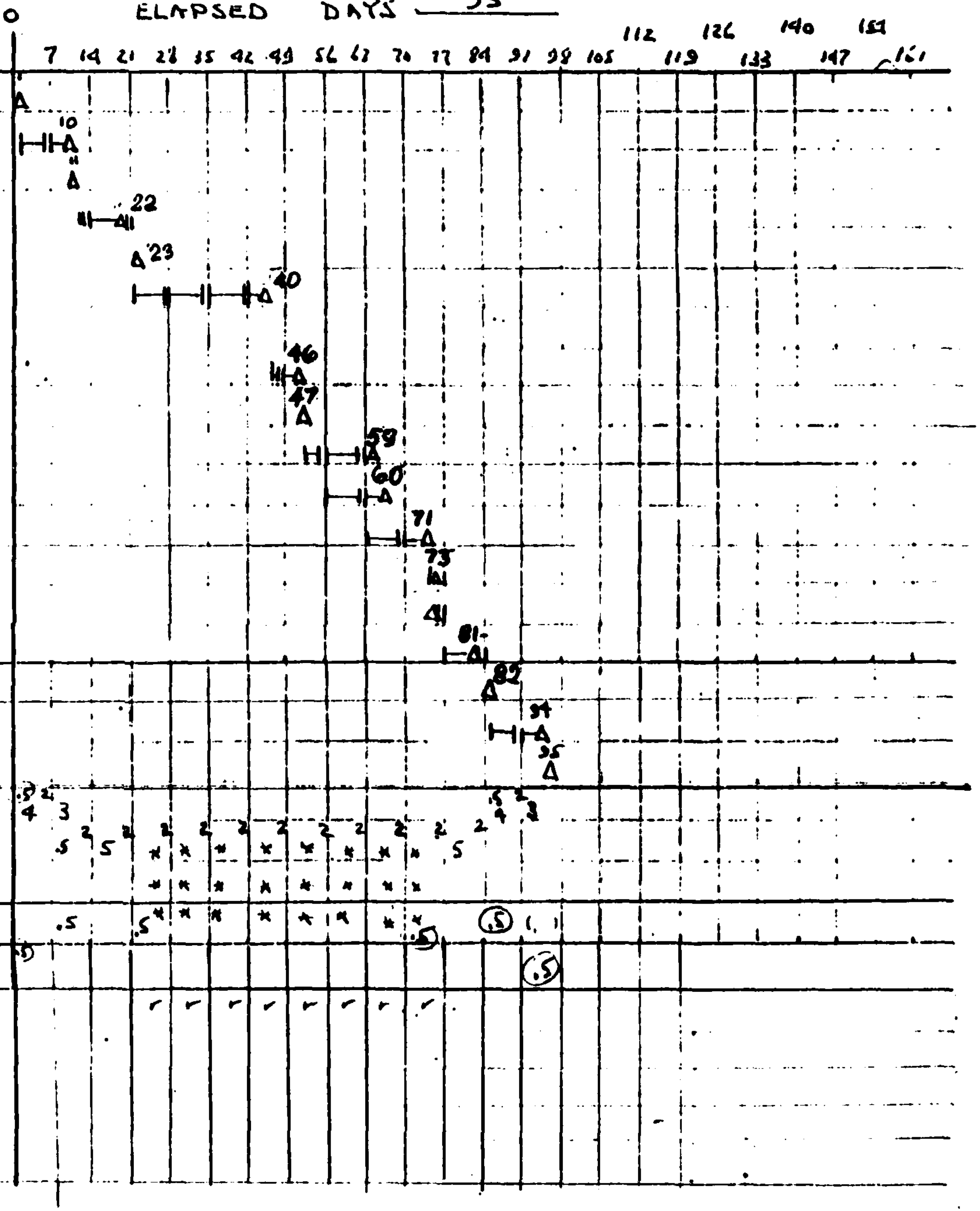
DATE 5-3-78 TITLE NAVFAC - SCENARIO 3

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L	EXT.
LABOR 4788 HOURS @ 25.00/HR =	119,700					119,700.
MATERIAL COST (GMDI)	129,978					129,978.
HANDLING @ 15% =	19,497					—
LEASE & RENTAL COSTS	592,888					592,888.
SUBTOTAL: LABOR, MATL, HANDLING L&R	862,063					
S/Y ENGINEERING 220 HRS @ 21.50 =	4,730					4,730.
GMDI ENGINEERING 520 HRS @ 20.71 =	10,770					10,770.
GMDI CONSTRUCTION SUPERVISION 352 HRS @ 21.76 =	7,660					7,660.
ODC: HOTEL, SUBSISTENCE, MILEAGE	1,633					1,633.
SUB-TOTAL	886,856					
ALLOWANCE FOR REPAIR COST AFTER DEMOBILIZATION	20,000					20,000.
		TOTAL MATL, LEASE, LABOR & OH, REPAIR COST				887,359.
		G&A @ 10% =				88,736.
TOTAL LEASE COST	906,856				S.T.	976,095.
		FEE @ 10% :				97,610.
		TOTAL				1,073,705.
ADD TRAVEL EXPENSE						
PROJECT PERSONNEL 29,800						
UCT PERSONNEL -0-						
TOTAL	29,800					29,800.
TOTAL	936,656					1,103,505.

SCENARIO 3 SCHEDULE

ELAPSED DAYS 95

	WORK DAYS
TRANSIT TO S/Y	1
RIG FOR IMPLANTMENT	7
TRANSIT S/Y TO PORT HUENEME	1
ADD OCE EQUIPT. @ P.H.	7
TRANSIT P.H. TO SITE	0.5
SEA TRIALS & TRAINING	13
INSTALL NAVIGATION SYSTEM / INSTALL CONSTRUCTION MOOR	4
IMPLANT ARRAYS	1
TEST DELTA ARMS & CLUMP ANCHORS	8
INSTALL FINAL LEG & CLUMP ANCH. TEST	+1
IMPLANT PROJECTORS IMPLANT	+7
INSTALL CURRENT METER STRINGS	2
TRANSIT SITE TO P.H.	0.5
OFFLOAD OCE EQUIPT AT P.H.	6
TRANSIT P.H. TO S/Y.	1
DE-RIG	8
TRANSIT FROM S/Y	1
H.P. USAGE -0-	
400	
1000	
3000	
5750	
DIVERS' BOATS -	



NAV FAC - SCENARIO 3 - SCHEDULE

WORK BOAT - 194' x 40'

BARGE 130' x 30'

5-2-78

0072

T-24

4.27.78 5-3-78 Scenario 3

Fuel

Workboat 194' x 40'	~~[illegible]~~ LT	421 LT
Thruster	~~[illegible]~~ LT	51
Barge Hotel Reqmts	~~[illegible]~~ LT	110
Crane Diesels	~~[illegible]~~ LT	53
	~~1455~~ LT	
(2) Divers' Boats		160
Total		795 LT

MADE BY Dgk GLOBAL MARINE DEVELOPMENT INC. W.O. No./A.F.E. No. 04072

CHECKED BY 5-4- ESTIMATE SHEET SHEETS ___ SHEET NO. ___

DATE ~~4-27-78~~ TITLE NAV FAC : SCENARIO 3

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
FUEL:					
WORKBOAT 194' x 40' CONT HP = 5750					
(1) TRANSIT TO S/Y 120 MI @ 12 KNOTS	5750 HP				
12 HRS ~~-0- HP~~ ALLOW 5750 HP	12 HOURS	1 DAY			
(2) TRANSIT TO PT. HUENEME					
TOWING BARGE - 3000 HP	12 HRS				
120 MI @ 10 KNOTS					
12 HRS @ 400 HP	12 HRS	1			
(3) ADD EQUIPMENT AT PT. H.	6				
400 HP 24 HRS/DAY	~~[illegible]~~ DAYS				
(4) TRANSIT PT. H. TO SITE [redacted]					
80 [redacted] MI @ 10 KNOTS =	.5			~~[illegible]~~	~~300 HRS~~
TOWING BARGE - 3000 HP	~~[illegible]~~ DAYS	~~[illegible]~~ INC. =		~~40 %~~	~~[illegible]~~
					~~450 [illegible]~~
				=	~~[illegible]~~
(5) SEA TRIALS - 12 HRS/DAY.	12 DAYS				
4 HRS DAY @ 3000 HP					
8 HRS DAY @ 1000 HP					
12 HRS DAY @ 400 HP					
(6) RETRIEVE - DEPLOY & RELOCATE ARRAYS	[illegible]				
4 HRS/DAY @ 3000 HP	23				
8 HRS/DAY @ 1000 HP	~~[illegible]~~ DAYS				
12 HRS/DAY @ 400 HP					
(7) TRANSIT ~~PT. A.~~ SITE TO PT. H.	.5				
80 ~~3200~~ MI @ 10 KNOTS . 3000 HP	~~[illegible]~~ DAYS				
(8) REMOVE EQUIPMENT AT PT. H.					
400 HP	5 DAYS				
(9) TRANSIT PT. H TO S/Y.					
3000 HP	12 HRS				
400 HP	12 HRS				
(10) DE-RIG -0- HP.					
(11) TRANSIT FROM S/Y 5750 HP	12 HRS				

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4-27-78

NAV-FAC Scenario 3

FUEL

① TRANSIT TO S/Y

7 $\left[(.5 \text{ DAYS})(5750 \text{ HP}) + (.5 \text{ DAYS})(\text{-0- HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right) \cdot \frac{.45}{54} = $ 575 CU FT 194' 218 392 CU FT

7 RIG

② TRANSIT TO PT. H.

1 $\left[(.5 \text{ DAYS})(3000 \text{ HP}) + (.5 \text{ DAYS})(400 \text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right) \cdot \frac{.45}{54} = $ 340 CU FT

③ AT PT. H.

~~5~~ 6 $\left[(\cancel{5}\ 6 \text{ DAYS})(400 \text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right) = $ ~~400~~ 480 CU FT

④ TRANSIT TO ~~PT. ALLEN~~ SITE

~~19~~ 0.5 $\left[(\cancel{19}\ .5 \text{ DAYS})(3000 \text{ HP})\right]\frac{24 \text{ HRS}}{\text{DAY}} \cdot \frac{.45}{54} = $ ~~11,400~~ 300 CU FT

⑤ SEA TRIALS

24,800 HP·HRS/DAY

$(13 \text{ DAYS})\left(\left[3000 \text{ HP}\left(\frac{4 \text{ HRS}}{\text{DAY}}\right)\right] + \left[1000 \text{ HP}\left(\frac{8 \text{ HRS}}{\text{DAY}}\right)\right] + \left[400 \text{ HP}\left(\frac{12 \text{ HRS}}{\text{DAY}}\right)\right]\right)\frac{.45}{54}$

= 2687 CU FT

⑥ ~~RETRIEVE - DEPLOY & RELOCATE ARRAYS~~ IMPLANT ARRAYS 24,800

28 $(\cancel{28}\ 23 \text{ DAYS})\left(\left[3000 \text{ HP}\left(\frac{4 \text{ HRS}}{\text{DAY}}\right)\right] + \left[1000 \text{ HP}\left(\frac{8 \text{ HRS}}{\text{DAY}}\right)\right] + \left[400 \text{ HP}\left(\frac{12 \text{ HRS}}{\text{DAY}}\right)\right]\right)\frac{.45}{54}$

= ~~5,787~~ 4754 CU FT

⑦ TRANSIT ~~PT. A~~ SITE TO PT H.

19 $\left[(\cancel{19}\ .5 \text{ DAYS})(3000 \text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right) = $ ~~11,400~~ 300 CU FT

⑧ REMOVE EQUIPT AT PT. H.

5 $\left[(5 \text{ DAYS})(400 \text{ HP})\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right)\right] = $ 400 CU FT

⑨ TRANSIT PT. H. TO S/Y.

1 SAME AS ② = 340 CU FT

7 ⑩ DE-RIG = -0- CU FT

1 ⑪ TRANSIT FROM S/Y

107 SAME AS ① = 575 CU FT

SUBTOTAL ~~[illegible]~~ 10,751

⑫ WEEKENDS (~~EXCEPT IN TRANSIT~~)

30 $\left[(4 \text{ DAYS})(\text{-0- HP}) + (\cancel{26}\ 22 \text{ DAYS})(400 \text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\frac{.45}{54}$ ~~2080~~ 1760 CU FT

137 TOTAL 12,511 ~~[illegible]~~ CU FT

DELIVER 372 17873 ~~[illegible]~~ GAL

530 MC

= 42.5 ~~[illegible]~~ 421 LT ~~[illegible]~~ LT

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CHECKED BY ESTIMATE SHEET SHEETS SHEET NO.

DATE 5-4-78 TITLE NAVFAC - SCENARIO 3

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
FUEL					
THRUSTER					
SEA TRIALS & TRAINING	13 DAYS				
IMPLANT ARRAYS	23 DAYS				
	36 DAYS				
$(36 \text{ DAYS})(500 \text{ HP})\left(\frac{10 \text{ HRS}}{\text{DAY}}\right)\frac{0.45}{54} =$	1500	CU FT @ 70% CAPACITY			
	2150	CU FT @ 100% "			
÷ 42.5 CU FT/L.T.				51 LT	
BARGE HOTEL REQMTS					
RUNNING LIGHTS ONLY					
S/Y TO P.H. 25 HP	1 DAY				
P.H. TO S/Y 25 HP	1 DAY	2 DAYS			
REDUCED USAGE					
AT P.H. 2 W/E 25 HP	4 DAYS	8 DAYS @ 25 HP			
6 W/D 125 HP	6 DAYS	11 DAYS @ 125 HP			
OFFLOAD P.H. 2 W/E 25 HP	4 DAYS				
5 W/D 125 HP	5 DAYS				
FULL USAGE					
TRANSIT TO SITE, SEA TRIALS & TNG	18.5 DAYS				
IMPLANT ARRAYS, TRANS TO P.H.	23.5 DAYS				
OPNL W/E : 7	14 DAYS				
	56 DAYS				
$\left[(2 \text{ DAYS})(25 \text{ HP}) + (8 \text{ DAYS})(25 \text{ HP}) + (11 \text{ DAYS})(125 \text{ HP}) + (56 \text{ DAYS})(250 \text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{0.45}{54}\right) =$				3125	CU FT @ 70% CAP.
				4470	" @ 100% CAP.
	÷ 42.5 CU FT/LT =			110	LT
CRANE DIESELS					
AT P.H. 2 @ 200 HP 10 HRS/DAY	11 DAYS				
SEA TRIALS & TNG	13 DAYS				
IMPLANT ARRAYS	23 DAYS				
	47 DAYS				
$(2)(47 \text{ DAYS})(200 \text{ HP})\left(\frac{10 \text{ HRS}}{\text{DAY}}\right)\left(\frac{0.45}{54}\right) =$				1570	CU FT @ 70% CAP
				2250	CU FT 100% CAP
	÷ 42.5 CU FT/LT =			53	LT

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CHECKED BY ESTIMATE SHEET SHEETS ___ SHEET NO. ___

DATE 5-4-78 TITLE NAVFAC - SCENARIO 3

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
FUEL (CONT'D)					
DIVERS' BOATS (2)					
EACH WITH TWIN GM-D671 DIESELS					
= 325 HP/ENGINE = 650 HP/BOAT					
= 1300 HP/2 BOATS					
SEA TRIALS & TRAINING	13 DAYS				
IMPLANT ARRAYS	23 DAYS				
WEEKENDS 7 x 2 DAYS x 50% =	7 DAYS				
	43 DAYS				
$(43 \text{ DAYS})(1300 \text{ HP})\left(\frac{10 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right) =$	4660	CU FT	@	70% CAPACITY	
	6660	CU FT	@	100% CAPACITY	
$\div 42.5 \frac{\text{CU FT}}{\text{LT}} =$			160 LT		

Dad

04072

5-9-76

SCENARIO 3

LEASE

ADD TRAVEL EXPENSE FOR PROJECT AND UCT PERSONNEL:

PROJECT PERSONNEL

OPS DIRECTOR

PER DIEM: DAY 1, 2,3,4,5 6-7, 8,9,10 11, 12, 13-14,
15-19, 20-21, 27-28, 34-35, 41-42, 48-49
55-56, 62-63, 69-70, 76-77, 78-82, 83
= 40 DAYS @ 35.00 = $1400 -

AIRFARE: WASH DC TO LAX RD TRIP 414 -

MILEAGE: LAX TO PT. H RD TRIP = 180 MI
DAILY 38 DAYS @ 30 MI = 1140 MI
1320 MI @ .17 = 225 -

2,039 -

BALANCE OF PROJECT TEAM: (23 PEOPLE)

PER DIEM: DAY 19 20-21, 27-28, 34-35, 41-42, 48-49
55-56, 62-63, 69-70, 75, 76 = 19 DAYS @ 35.00 = 665 -

AIRFARE: WASH DC TO LAX RD TRIP 414 -

MILEAGE: LAX TO PT H. RD TRIP = 180 MI
DAILY 19 DAYS @ 30 MI = 570 MI
750 MI @ .17 = 128 -

1207 -

X 23 = 27,761 -

TOTAL $29,800 -

UCT PERSONNEL

BASED AT PORT HUENEME -0-

TOTAL $29,800 -

APPENDIX U

CONTRACT OPTION COSTS

MADE BY DBB
CHECKED BY
DATE 5-9-78

GLOBAL MARINE DEVELOPMENT INC.

ESTIMATE SHEET

TITLE Scenario 1

W.O. No./A.F.E. No. 04072
SHEETS 1 SHEET NO. 1

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
Contract					
Modify Drillship to Work Platform & Add Special Equipt.	See	Separate	Schedule		
Mobilization at Port Hueneme					
Lease Work Platform 111	Days	@	4955.00/Day		550,005
Provisions					
35 people 55 days @ 8.50/man/day =	16,363.				
36 people 40 days @ - - - - =	12,240				
18 people 16 days @ - - - - =	2,448.				31,051
Fuel Diesel #2 @ 106.00/LT	605	LT			64,130
Lube Oil 111 days @ 7.50/day =					833
General Consumables 111 days @ 25.00/day					2,775
Crew Cost					
35 men 111 days @ 134.00 day					520,590
OH @ 75% =					390,443
Construction Program					—
Demobilization					—
Sub-Total					1,559,827.
		G&A @ 10%		=	155,983
				ST	1,715,810
Add Travel Expense:					
Project Personnel (1) 2635		Fee @ 10%		=	171,581
UCT Personnel -0- -0-		Total			1,887,391
Sub-Total					2,635
Total					1,890,026.

Job No. 04072

CONTRACT - MODIFIED DRILL SHIP

NAV FAC - SCENARIO 1 - SCHEDULE

SCENARIO 1 SCHEDULE

ELAPSED DAYS 111

Activity	Work Days	Elapsed day (end)
(1) Transit to S/Y	.5	
(2) Modify Drill Ship to Work Platform	Lead Time: 9 Months Incl. Engrg - Modification - Sea Trials	
(3) Transit S/Y to Port Hueneme	1	1
(4) Add any special equip @ P.H. & Mobilize personnel	2	3
(5) Transit Pt. H. to Pt. Allen Kauai	25	28
(6) Sea Trials & Training	13	45
(7) Retrieve (5) Old Arrays	7	54
(8) Deploy (9) New Arrays	14	74
(9) Relocate (4) S.W. Arrays	6	82
(10) Transit Pt. A. to Pt. H.	25	109
(11) Demobilize at Pt. H.	1	110
(12) Transit to LB/LA Harbor	1	111
Total	95	

Elapsed days scale: 0, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161

HP usage	0	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
-0-																
400	2				x 2	x 2	x 2	x 2	x 2	x 2	x 2	x 2				1
1,000				.25	x	x	x	x	x	x	x	x	→			.25
1400	1				x	x	x	x	x	x	x	x				1
Food	7	7	7	7	5 2	5 2	5 2	5 2	5 2	5 2	5 2	5 2	7	7	7	6
Personnel	35	35	35	35	18/36	18/36	18/36	18/36	18/36	18/36	18/36	18/36	35	35	35	35

Made by DBL

Date 5-10-78

SCENARIO 1

CONTRACT
GLOMAR V

TRANSIT PT. ALLEN FR PT HUENEME
3200 MI @ 7 KNOTS =

$3200 \times .868 = 2778^{Nm}$ ÷ 7 Kn = $\frac{397 \text{ HRS}}{24}$ = 16.5 DAYS
+50% = 8.5
25 DAYS

PROVISIONS
35 ~~25~~ MEN ~~55~~ DAYS @ 8^{50}/MAN
~~56~~ " ~~35 DAYS~~ "
44 " 16 DAYS ✓

FUEL ✓

TRAVEL EXPENSE
1 MAN (PROJECT)

OPS DIRECTOR (-1)		WORK W/E
PER DIEM DAY (1)-(4) = ~~4~~ 5 × 35^{00} =	175 -	
AIRFARE WASH DC TO LAX RD TRIP	414 -	
MILEAGE LAX TO PT. H. - - 180 MI @ .17/MI =	31 -	
DAILY MILEAGE: 30 MI × 4 DAYS @ .17/MI =	21 -	
AIRFARE: WASH DC TO LAX RD TRIP	414 -	
LAX TO HONOLULU - -	300 -	
HONOLULU TO PT ALLEN - -	44 -	* 2@35
* WORK WEEKENDS — PER DIEM: DAYS* 27-28, 34-35, 41-42, 48-49, 55-56, 62-63, 69-70, 76-77, 83-84 (18) @ 35 =	630 -	= *70 -
AIRFARE WASH DC TO LAX RD TRIP	414 -	
MILEAGE LAX TO PT H - - 186 MI @ .17/MI =	31 -	
DAILY MILEAGE: 30 MI × 4 DAY = 120 MI @ .17/MI =	21 -	
PER DIEM: DAYS 108, 109, 110, 111 4 × 35^{00} =	140 -	
	2635 -	* 2075 -

04072

5-10-78 NAVFAC

Contract - Glomar V

Fuel

① Transit to Pt. Hueneme

$$\left[(.5 \text{ DAYS})(1400 \text{ HP}) + (.5 \text{ DAYS})(400 \text{ HP})\right]\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right) \overset{= 0.2}{} = 180 \text{ CU FT}$$

② At Pt. H.

$$\left[(2 \text{ DAYS})(400 \text{ HP})\right](0.2) = 160 \text{ CU FT}$$

③ Transit Pt. H. to Pt Allen Kauai

$$\left[(25 \text{ DAYS})(1000 \text{ HP})\right](0.2) = 5{,}000 \text{ CU FT}$$

④ Sea Trials, Training, Retrieve, Deploy & Relocate Arrays

$$(40 \text{ DAYS})\left(\left[(1400 \text{ HP})\left(\frac{4 \text{ HRS}}{\text{DAY}}\right)\right] + \left[(1000 \text{ HP})\left(\frac{8 \text{ HRS}}{\text{DAY}}\right)\right] + \left[(400 \text{ HP})\left(\frac{12 \text{ HRS}}{\text{DAY}}\right)\right]\right)\left(\frac{.45}{54}\right)$$

$$= 6134 \text{ CU FT}$$

⑤ Weekends at Construction Site

$$\left[(16 \text{ DAYS})(400 \text{ HP})\right](0.2) = 1280 \text{ CU FT}$$ (X)

⑥ Transit Pt. A to Pt. H.

$$\left[(25 \text{ DAYS})(1000 \text{ HP})\right](0.2) = 5{,}000 \text{ CU FT}$$

⑦ At Pt. H.

$$\left[(1 \text{ DAY})(400 \text{ HP})\right](0.2) = 80 \text{ CU FT}$$

⑧ Transit Pt. H. to LB/LA Harbor

$$\left[(.5 \text{ DAY})(1400 \text{ HP})\right](0.2) = 140 \text{ CU FT}$$

		Work weekends
70% cap	17,974 CU FT	16694
100% cap =	25,678 CF	23848
	605	562

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CHECKED BY ______ ESTIMATE SHEET SHEETS ____ SHEET NO. 1

DATE 5-11-78 TITLE NAVFAC - SCENARIO 2

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
CONTRACT					
MODIFY DRILLSHIP TO WORK PLATFORM & ADD SPECIAL EQUIPMENT.	SEE SEPARATE SCHEDULE				
MOBILIZATION AT PORT HUENEME					
LEASE WORK PLATFORM 26	DAYS @ 4955.00/DAY =				128,830
PROVISIONS					
35 PEOPLE 9 DAYS @ 8.50/MAN/DAY =	2678.-				
36 " 17 DAYS @ 8.50/MAN DAY =	5202.-				
TOTAL					7,880
FUEL DIESEL #2 @ 106.00/LT	130	LT			13,780
LUBE OIL 26 DAYS @ 7.50/DAY =					195
GENERAL CONSUMABLES: 26 DAYS @ 25.00/DAY =					650
CREW COST					
35 MEN 26 DAYS @ 134.00/DAY	=				121,940
OH @ 75% =					91,455
CONSTRUCTION PROGRAM					—
DEMOBILIZATION					—
SUB-TOTAL					364,730
			G&A @ 10% =		36,473
			ST		401,203
ADD TRAVEL EXPENSE:			FEE @ 10% =		40120
PROJECT PERSONNEL (1) 951.-		TOTAL			441,323
UCT PERSONNEL (-0) -0-					
SUB-TOTAL					951
TOTAL ESTIMATED COST					442,274

04072

CONTRACT - MODIFIED DRILL SHIP

NAV FAC - SCENARIO 2 - SCHEDULE

SCENARIO 2 SCHEDULE

ELAPSED DAYS 26

	WORK DAYS
(1) TRANSIT TO S/Y	.5
(2) MODIFY DRILL SHIP TO WORK PLATFORM	LEAD TIME = 9 MONTHS INCL. ENGRG, MODIFICATIONS, SEA TRIALS
(3) TRANSIT S/Y TO PT. HUENEME	1
(4) ADD ANY SPECIAL EQUIPT. @ P.H. & MOBILIZE PERSONNEL	2
(5) TRANSIT PT. H. TO SAN DIEGO	1
(6) TRAINING & SEA TRIALS	.5
(7) TOW SQUAW TO MOOR SITE	.5
(8) MOOR SQUAW	7
(9) TRANSIT TO SAN DIEGO	.5
(10) TRANSIT TO PT. H.	1
(11) DEMOBILIZE	1
(12) TRANSIT PT. H. TO LA/LB HARBOR	1
Σ =	20

Elapsed days scale: 0, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161

HP USAGE: -0-, 400, 1000, 1400

FOOD - PERSONNEL, DAYS

5-10-78

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5-11-78 SCENARIO 2

CONTRACT -

FUEL

① TRANSIT TO PT. HUENEME

$\left[(.5 \text{ DAYS})(1400 \text{ HP}) + (.5 \text{ DAYS})(400 \text{ HP})\right] \overbrace{\left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right)}^{= 0.2}$ = 180 CU FT

② AT PT. H. 160 --

③ TRANSIT PT. H. TO SAN DIEGO @ 7 KNOTS 180 mi = 157 N.M.

157 N.M ÷ 7 Kn = 22.5 HRS

$(1 \text{ DAY})\ 1400 \text{ HP} \left(\frac{24 \text{ HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right)$ = 280 --

④ SEA TRIALS, TRAINING; ~~[illegible]~~

$(5 \text{ DAYS})\left(\left[(1400 \text{ HP})\left(\frac{4 \text{ HRS}}{\text{DAY}}\right)\right] + \left[(1000 \text{ HP})\left(\frac{8 \text{ HRS}}{\text{DAY}}\right)\right] + \left[(400 \text{ HP})\left(\frac{12 \text{ HRS}}{\text{DAY}}\right)\right]\right)\left(\frac{.45}{54}\right)$ 767 --

= 18,400 HP HRS

⑤ TOW SQUAW TO MOOR SITE

(0.5 DAY)(1000 HP)(0.2) = 100 --

⑥ MOOR SQUAW

$(7 \text{ DAYS})(18{,}400 \text{ HP}\cdot\text{HRS})\left(\frac{.45}{54}\right)$ = 1074 --

⑦ TRANSIT TO SAN DIEGO

[(0.5 DAY)(1400 HP) + (0.5 DAY)(400 HP)] (~~0.2 CU FT~~/HP·DAY) = 180 --

⑧ TRANSIT TO PT. HUENEME

(1 DAY)(1400 HP)(0.2 CF/HP·DAY) = 280 --

⑨ DEMOBILIZE AT PT. H.

(1 DAY)(400 HP)(0.2) = 80 --

⑩ TRANSIT PT. H. TO LB/LA HARBOR

(1 DAY)(1400 HP)(0.2) = 280 --

* ⑪ WEEKENDS (6-7, 13-14, 20-21,)

(6 DAYS)(400 HP)(0.2) = 480 -- ⓧ

OMIT IF WORK WEEKENDS

3381

÷ 42.5 CU FT/LT = 70% CAP 3861 CU F

100% CAP = 5516 CF 4830

130 T 114 LT

PROVISIONS

35 people 9 DAYS

36 people 17 DAYS

WORK WEEKENDS 180

4 × 30 = 120

300 @ .17

245

414

51

710

TRAVEL EXP

PROJECT PERSONNEL (1) OPS DIRECTOR ⑦ : 245

PER DIEM : DAY (-1),(1) 2,3,(6,7)(13-14),(20-21), 25 26 27 : 13 DAYS @ 35 = 455

AIRFARE . WASH DC TO LAX - RD TRIP 180 414

MILEAGE LAX - PT H / 180 + DAILY : 1,2,3,(6-7)(13-14)(20-21) 25) · 10 × 30 : 300 / 480 mi × .17 : 82

951

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CHECKED BY ___ ESTIMATE SHEET SHEETS ___ SHEET NO. 1

DATE 5-11-78 TITLE NAVFAC - SCENARIO 3

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
CONTRACT					
MODIFY DRILLSHIP TO WORK PLATFORM & ADD SPECIAL EQUIPMENT.	SEE SEPARATE SCHEDULE				
MOBILIZATION AT PORT HUENEME					
LEASE WORK PLATFORM 58 + (1) 30' WORKBOAT + (1) 37' WORKBOAT	DAYS @ 4955.00/DAY =				287,390
58	DAYS @ 450.00/DAY =				26,100
PROVISIONS					
35 PEOPLE 21 DAYS @ 8.50/MAN/DAY =	6248				
36 " 37 " =	11,322				
					17,570
FUEL DIESEL #2 @ 106.00/LT	446	LT			47,276
LUBE OIL 58 DAYS @ 7.50/DAY =					435
GENERAL CONSUMABLES: 58 DAYS @ 25.00/DAY =					1450
CREW COST					
35 MEN 58 DAYS @ 134.00/DAY	=				272,020
OH @ 75% =					204,015
CONSTRUCTION PROGRAM					—
DEMOBILIZATION					—
SUB-TOTAL					856,256
		G&A @ 10% =			85,626
		ST			941,882
ADD TRAVEL EXPENSE:		FEE @ 10% =			94,188
PROJECT PERSONNEL (1) 1357		TOTAL =			1,036,070
UCT PERSONNEL (-0-) -0-					
SUB-TOTAL					1,357
TOTAL ESTIMATED COST					1,037,427

Job No. 04072

Contract · Modified Drill Ship

NAV FAC - Scenario 3 - Schedule

Scenario 3 Schedule

ELAPSED DAYS 58

Activity	Work Days	Elapsed days marked on chart
① Transit to S/Y	0.5	
② Modify Drill Ship to Work Platform	Lead Time: 9 Months Incl. Engrg - Modification - Sea Trials	
③ Transit S/Y to Port Hueneme	1	1
④ Add any special equip @ P.H. & mobilize personnel	2	3
⑤ Transit P.H. to site	0.5	4
⑥ Training & Sea Trials	13	23
⑦ Install Navigation System	4 (⑦–⑧)	
⑧ Install Construction Moor		29
⑨ Implant Arrays	1	30
⑩ Test Delta Arms & Clump Anchors	8	40
⑪ Install final leg & clump anchor	+1	43
⑫ Implant Projectors - Test Implant	+7	52
⑬ Install Current Meter Strings	2	54
⑭ Transit site to Pt. H.	0.5	57
⑮ Demobilize @ Pt. H.	1	
⑯ Transit Pt. H. to LB/LA Harbor	1	58
HP Usage -0-		
400		
1000		
1400		
Food		

Elapsed day scale: 0, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161

	0–7	7–14	14–21	21–28	28–35	35–42	42–49	49–56	56–63
Personnel	35 / 36	36 / 35	36 / 35	36 / 35	36 / 35	36 / 35	36 / 35	36 / 35	35
Days	3 / 2 / 2	5 / 2	5 / 2	5 / 2	5 / 2	5 / 2	5 / 2	5 / 2	2

35 36
3
18 37
21 , 37 · 56

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5-10-78

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5-16-78

NAVFAC - SCENARIO 3

CONTRACT
DRILL SHIP -
FUEL

		DIVERS BOATS	CONTRACT NO W/E CF	CONTRACT WORK W/E CF
1	TRANSIT TO PT. H.	-0-	180	
2	AT PT. H.	-0-	160	
3	TRANSIT PT. H TO SITE	-0-	180	
4	TRAINING & SEA TRIALS	2	1994	
5	INSTALL NAV SYST. & CONST. MOOR	1	614	
6	IMPLANT ARRAYS	1	154	
7	TEST Δ ARMS & CLUMP ANCHORS	2	1228	
8	INSTALL FINAL LEG & CLUMP ANCHOR	2	154	
9	IMPLANT PROJECTORS & TEST	2	1078	
10	INSTALL CURRENT METER STRINGS	1	307	
11	TRANSIT TO PT. H.	-0-	180	6449
12	DEMOBILIZE AT PT. H.	-0-	80	
13	TRANSIT PT. H. TO LB/LA HARBOR	-0-	140	
14	DIVERS BOATS		3900	3521
15	WEEKENDS		1280	-0-
16	CRANE DIESELS		1634	1634
	TOTAL CF @ 70%		13263	11,604
	TOTAL CF @ 100%		18,948	16,578
	÷ 42.5 CU FT/LT			
	LT =		446	391
	@ 106.60/LT =		47,276	41,446

DBS.

5-11-78 Scenario 3 $\frac{.45}{54} = 0.0083333$

Contract

Fuel

(1) Transit to Pt. H. 180 CF

(2) At Pt. H. 160 CF

(3) Transit Pt. H. to site (no divers' boats)
$((0.5\text{ day})(1400\text{ HP}) + (0.5\text{ day})(400\text{ HP}))(0.2)$ = 180 CF

(4) Training & Sea Trials ((2) divers boats)
HP-HRS $(13\text{ days})[(1400\text{HP})(\frac{4\text{ HRS}}{\text{DAY}}) + (1000\text{HP})(\frac{8\text{ HRS}}{\text{DAY}}) + (400\text{HP})(\frac{12\text{ HRS}}{\text{DAY}})](\frac{.45}{54})$ = 1994 CF

(5) Install Nav System + Install Construction Mode ((1) D. Boat)
$(4\text{ days})[18400\text{ HP-HRS}]\frac{.45}{54}$ = 614 CF

(6) Implant Arrays ((1) D. Boat)
$(1\text{ day})[18400]\frac{.45}{54}$ 154 CF

(7) Test Δ arms & clump anchors ((2) D. Boats)
$(8\text{ days})[18400]\frac{.45}{54}$ 1228 CF

(8) Install Final Leg & Clump Anchor $\pm$(1) day [2 D Boats]
(1 day)[154 CF

(9) Implant Projectors & Test +7 days ((2) D Boats)
(7 days)[1078 CF

(10) Install Current Meter Strings ((1) D Boat)
(2 days)[307 CF

(11) Transit to Pt H.
$[(0.5\text{ day})(1400\text{HP}) + (0.5\text{ day})(400\text{HP})](0.2)$ 180 CF

(12) Demobilize @ Pt. H.
$(1\text{ day})\ 400\text{ HP}\ ^{2\text{nd}}(0.2)$ 80 CF

(13) Transit Pt. H to LB/LA Harbor
$(1\text{ day})(0.5)(1400\text{HP})(0.2)$ 140 CF

(14) Divers' Boats
(5) (6)
$[(2)(13)(650\text{ HP}) + (1)(4)(650\text{ HP}) + (1)(1)(650\text{ HP}) + (2)(8)(650\text{HP})$
$+ (2)(1)(650\text{ HP}) + (2)(7)(650\text{HP}) + (1)(2)(650\text{HP})](\frac{.45}{54})(\frac{10\text{ HRS}}{\text{DAY}})$
$+(7)(1)(2)(650\text{ HP})(0.5)$ weekends

2×13 = 26
1×4 = 4
1×1 = 1
2×8 = 16
1×2 = 2
2×7 = 14
1×2 = 2
65

$(65)(650)(\frac{.45}{54})(\frac{10\text{ HRS}}{\text{DAY}})$ + W/E

Provisions
35 people 21 days
36 " 37 days

3521
3900 CF
1280 CF *
9970 CF 707 CF
14,243 CF 100% cap
11,629 CF
16,613 = ~~6802 CF~~ ~~9918 CF~~
$\div \frac{42.5\text{ CF}}{\text{LT}}$ =
391 LT
336 LT
= ~~761 LT~~
229 LT

* omit if work weekends

(15) * Weekends 6-7, 13-14, 20-21, 27-28, 34-35, 41-42, 48-49, 55-56
$(8) \times (2) \times (400\text{HP})(\frac{24\text{ HRS}}{\text{DAY}})(\frac{.45}{54}) = 1280\text{ CF}$
w/e days

L.93

5-11-78 Scenario 3

Contract
Travel Expense

Project Personnel
Ops Director

Per Diem

Day: (-1), 1,2,3, 6-7, 13-14, 20-21, 27-28, 34-35, 41-42, 48-49, 54, 55-56, 57, 58 = 23 days @ 35- = 805-

40, 41,42,43 = 8 = 280

Airfare: Wash DC to LAX Rd Trip 414- 414

Mileage LAX to Pt. H. Rd Trip 180 mi

Daily 21 days @ 30 mi = 630 mi

810 mi @ .17 = 138-

(7) 180 + 210 = 390 @ .17 = 67-

Total 1357- 761-

LSB8

5-11-78 SCENARIO 3

2 - 26' MONARK WORKBOATS (NEW (1) 30' + (1) 37')
@ 54,000 ea = $108,000.

CAPITALIZE :

FINANCE

EQUITY	20%	21,600
DEBT	80%	86,400
		108,000.

× 1.1 = 118,800 ÷ 5 = 23,760.

DEBT : 5 YR 10%

AMORT PER YEAR = 23,760

CASH FLOW

YR	0	1	2	3	4	5
AMT	21,600	(R-)	(R-)	(R-)	(R-)	(R-)

(R-23760)

DISCOUNT 12.5%

$$21600 \, x \int^{n=5} \frac{(R - 23760\,m)}{(1+.125)^n}$$

$$\frac{21600\,x}{} = (3.56)(R - 23,760\,m)$$

$$\underline{6068} = R - 23,760\,m$$

$$R = 29,828 \text{ /YR} = \underline{82^{00}\text{/DAY}}$$

DIVERS BOATS

TRAINING & SEA TRIALS	(2 BOATS)(13 DAYS)(650 HP)	26 BOAT DAYS
IMPLANT NAV SYSTEM & CONST. MOOR	(1 BOAT)(4 DAYS)(650 HP)	4
IMPLANT ARRAYS	(1 BOAT)(1 DAY)(650 HP)	1
TEST Δ ARMS	(2 BOATS)(8 DAYS)(650 HP)	16
INST FINAL LEG & CLUMP ANCHOR	(2 BOATS)(1 DAY)(650 HP)	2
IMPLANT PROJECTORS & TEST	(2 BOATS)(7 DAYS)(650 HP)	14
INSTALL CURRENT METER STRINGS	(1 BOAT)(2 DAYS)(650 HP)	2
WEEKENDS (7)	(1 BOAT)(2 DAYS × .5 × 7)(650 HP)	7
		72

$(72)(650)\left(\frac{10\ \text{HRS}}{\text{DAY}}\right)\left(\frac{.45}{54}\right) = 3900\ \text{LT}$

MADE BY DBB | GLOBAL MARINE DEVELOPMENT INC. | W.O. No./A.F.E. No. 04072

CHECKED BY | ESTIMATE SHEET | SHEETS ____ SHEET NO. 1

DATE 5-12-78 | TITLE NAVFAC - SCENARIO 1

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
CONTRACT (WORK WEEKENDS) MODIFY DRILLSHIP TO WORK PLATFORM & ADD SPECIAL EQUIPMENT.	SEE SEPARATE SCHEDULE				
MOBILIZATION AT PORT HUENEME					
LEASE WORK PLATFORM 95 DAYS @ 4955.00/DAY =					470,725
PROVISIONS					
35 PEOPLE 55 DAYS @ 8.50/MAN/DAY =	16,363				
36 PEOPLE 40 DAYS @ " " " =	12,240				
					28,603
FUEL DIESEL #2 @ 106.00/LT	562	LT			59,572
LUBE OIL 95 DAYS @ 7.50/DAY =					713
GENERAL CONSUMABLES: 95 DAYS @ 25.00/DAY =					2,375
CREW COST					
35 MEN 95 DAYS @ 134.00/DAY	=				445,550
OH @ 75% =					334,163
CONSTRUCTION PROGRAM					—
DEMOBILIZATION					—
SUB-TOTAL					1,341,701
			G&A @ 10% =		134,170
ADD TRAVEL EXPENSE:			ST		1475871
PROJECT PERSONNEL (1) 2,075			Fee @ 10% =		147,587
UCT PERSONNEL (-0-) -0-					1,623,458
SUB-TOTAL					2075
TOTAL ESTIMATED COST					1,625,533

JOB NO. 04072

CONTRACT - MODIFIED DRILL SHIP

NAV FAC - SCENARIO 1 - SCHEDULE

MADE BY DBL

DATE 5-10-78

SCENARIO 1 SCHEDULE
(WORK WEEKENDS)

ELAPSED DAYS 95

	WORK DAYS	Elapsed day marked on chart
① TRANSIT TO S/Y	.5	Δ at 0
② MODIFY DRILL SHIP TO WORK PLATFORM	LEAD TIME: 9 MONTHS INCL. ENG'G, MODIFICATION - SEA TRIALS	
③ TRANSIT S/Y TO PORT HUENEME	1	1
④ ADD ANY SPECIAL EQUIP @ P.H. & MOBILIZE PERSONNEL	2	3
⑤ TRANSIT PT. H. TO PT. ALLEN KAUAI	25	28
⑥ TRAINING & SEA TRIALS	13	41
⑦ RETRIEVE (5) OLD ARRAYS	7	48
⑧ DEPLOY (9) NEW ARRAYS	14	62
⑨ RELOCATE (4) S.W. ARRAYS	6	68
⑩ TRANSIT PT. A. TO PT. H.	25	93
⑪ DEMOBILIZE AT PT. H.	1	94
⑫ TRANSIT TO LB/LA HARBOR	1	95
Σ =	95	

Elapsed days: 0, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161

	7	14	21	28	35	42	49	56	63	70	77	84	91	98
HP USAGE: -0-														
400	2				x	x	x	x	x	x				1
1000	25 →				x	x	x	x	x	x	25 →			
1400	1				x	x	x	x	x	x				1
FOOD	7	7	7	7	7	7	7	7	7	5 (2)	7	7	7	4
PERSONNEL	35	35	35	35	36	36	36	36	36	36 (35)	35	35	35	35

MADE BY: DBB **GLOBAL MARINE DEVELOPMENT INC.** W.O. No./A.F.E. No. 04072

CHECKED BY: ______ ESTIMATE SHEET SHEETS ____ SHEET NO. 1

DATE 5-12-78 TITLE NAVFAC - SCENARIO 2

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
CONTRACT (WORK WEEKENDS)					
MODIFY DRILLSHIP TO WORK PLATFORM & ADD SPECIAL EQUIPMENT.	SEE SEPARATE SCHEDULE				
MOBILIZATION AT PORT HUENEME					
LEASE WORK PLATFORM 20	DAYS @ 4955.00/DAY =				99,100
PROVISIONS					
35 PEOPLE 2 DAYS @ 8.50/MAN/DAY	595				
36 PEOPLE 18 DAYS @ 8.50/MAN/DAY	5508				
TOTAL					6,103
FUEL DIESEL #2 @ 106.00/LT	114	LT			12,084
LUBE OIL 20 DAY @ 7.50/DAY =					150
GENERAL CONSUMABLES: 20 DAYS @ 25.00/DAY =					500
CREW COST					
35 MEN 20 DAYS @ 134.00/DAY	=				93,800
OH @ 75% =					70,350
CONSTRUCTION PROGRAM					—
DEMOBILIZATION					—
SUB-TOTAL					282 087
		G&A @ 10% =			28,209
				ST.	310,296
		FEE @ 10% =			31,030
					341,326
ADD TRAVEL EXPENSE:					
PROJECT PERSONNEL (1) 710.					
UCT PERSONNEL ( ) -0-					
SUB-TOTAL					710
TOTAL ESTIMATED COST					342,036

Job No. 04072

Contract - Modified Drill Ship

NAV FAC - Scenario 2 - Schedule

Scenario 2 Schedule
(Work Weekends)

ELAPSED DAYS 20

Elapsed-day scale: 0, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161

Activity	Work Days	Elapsed days
① Transit to S/Y	.5	Δ
② Modify Drill Ship to Work Platform	Lead Time: 9 months incl. Engr'g, Modifications, Sea Trials	
③ Transit S/Y to Pt. Hueneme	1	1 Δ
④ Add any special equip't @ P.H. & mobilize personnel	2	3 Δ
⑤ Transit Pt. H. to San Diego	1	4 Δ
⑥ Training & Sea Trials	5	9 Δ
⑦ Tow SQUAW to moor site	.5	10 Δ
⑧ Moor SQUAW	7	17 Δ
⑨ Transit to San Diego	.5	17 Δ
⑩ Transit to Pt. H.	1	18 Δ
⑪ Demobilize	1	19 Δ
⑫ Transit Pt. H. to LA/LB Harbor	1	20 Δ
Σ =	20	

HP usage:	0–7	7–14	14–21
-0-			
400	2.5	x	x 1
1000			
1400	1.5	x	x 1

Food - Personnel	0–7	7–14	14–21
Personnel	35 / 36	36	36 / 35
Days	1 / 6	7	5 / 1

Made by DBL

Date 5-10-78

MADE BY DGL — GLOBAL MARINE DEVELOPMENT INC. — W.O. NO./A.F.E. NO. 04072

CHECKED BY ______ — ESTIMATE SHEET — SHEETS ____ SHEET NO. 1

DATE 5-12-78 — TITLE NAVFAC - SCENARIO 3

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
CONTRACT (WORK WEEKEND'S)					
MODIFY DRILLSHIP TO WORK PLATFORM & ADD SPECIAL EQUIPMENT.	SEE SEPARATE SCHEDULE				
MOBILIZATION AT PORT HUENEME					
LEASE WORK PLATFORM 44 + (1) 30' WORKBOAT + (1) 37' WORKBOAT	DAYS @	4955.00/DAY =			218,020
44	DAYS @	450.00/DAY =			19,800
PROVISIONS					
35 PEOPLE 7 DAYS @ 8.50/MAN/DAY =	2,083				
36 PEOPLE 37 DAYS @ 8.50 - - =	11,322				
TOTAL					13,405
FUEL DIESEL #2 @ 106.00/LT	391	LT			41,446
LUBE OIL 44 DAY @ 7.50/DAY =					330
GENERAL CONSUMABLES: 44 DAYS @ 25.00/DAY =					1,100
CREW COST					
35 MEN 44 DAYS @ 134.00/DAY	=				206,360
OH @ 75% =					154,770
CONSTRUCTION PROGRAM					—
DEMOBILIZATION					—
SUB-TOTAL					655,231
		G	& A@	10% =	65,523
ADD TRAVEL EXPENSE:					720,754
					72,075
PROJECT PERSONNEL (1) 761			Fee@	10% =	792,829
UCT PERSONNEL (60-) -0-					761
SUB-TOTAL					
TOTAL ESTIMATED COST					793,590

Job No. 04072

Contract · Modified Drill Ship

NAV FAC - Scenario 3 - Schedule

Scenario 3 Schedule (Work Weekends)

ELAPSED DAYS 44

Activity	Work Days
① Transit to S/Y	0.5
② Modify Drill Ship to Work Platform	Lead Time: 9 Months Incl. Engrg - Modification - Sea Trials
③ Transit S/Y to Port Hueneme	1
④ Add any special equip @ P.H. & mobilize personnel	2
⑤ Transit P.H. to site	0.5
⑥ Training & Sea Trials	13
⑦ Install Navigation System	
⑧ Install Construction Mode	4
⑨ Implant Arrays	1
⑩ Test Delta Arms & Clump Anchors	8
⑪ Install final leg & clump anchor	+1
⑫ Implant Projectors - Test Implant	+7
⑬ Install Current Meter Strings	2
⑭ Transit site to Pt. H.	0.5
⑮ Demobilize @ Pt. H.	3
⑯ Transit Pt. H. to LB/LA Harbor	1

HP Usage
-0-
400
1000
1400

Food

Elapsed days	0	7	14	21	28	35	42
Personnel	35 / 36	36	36	36	36	36 / 35	35
Days	3 / 4	7	7	7	7	5 / 2	2

35	36
3	4
2	28
2	5
7	37

Made by DBA

Date 5-10-78

APPENDIX V

AMORTIZATION FORMULA

5 YEAR CONTRACT ONLY 5/9/78

CASE A: EQUIP + HULL

EXPECTED DAY RATE

HULL = 1.8M

EQUIP = 4.32M

TOTAL INVEST = 6.12M

CASH FLOW PER YEAR

REVENUE	R
AMORT	1.3
NET CASH FLOW	R−1.3

FINANCE

EQUITY = 20% ⇒ 1.22M

DEBT = 80% ⇒ 4.90M

DEBT : 5 YR 10%

AMORT PER YEAR = 1.3M

CASH FLOW

YR	0	1	2	3	4	5
AMT	(1.22)	R−1.3	R−1.3	R−1.3	R−1.3	R−1.3

DISCOUNT RATE = 12.5% (Per Noel DeWinter)

$$1.22M = \sum_{1}^{n=5} \frac{(R-1.3M)}{(1+.125)^n}$$

$$1.22M = 3.56\,(R-1.3M)$$

$$.34M = R-1.3M$$

$$R = 1.3+.34M = 1.64M \Rightarrow \$4500/\text{day}$$

CASE B: HULL ONLY

HULL = 1.8M

FINANCE

EQUITY = 20% = 360K

DEBT = 80% = 1,440K

DEBT: 5YR 10%

AMORT PER YEAR = 380K

CASH FLOW PER YEAR

REVENUE	R
AMORT	380
NCF	R-380

CASH FLOW

YR	0	1	2	3	4	5
AMT	(360)	R-380	R-380	R-380	R-380	R-380

DISCOUNT RATE = 12.5%

$$360K = \sum^{n=5} \frac{(R-380K)}{(1.125)^n}$$

$$360K = 3.56\,(R-380K)$$

$$101K = R - 380K$$

$$R = 481\ K/yr \Rightarrow \$1,320/day$$

5-10-78 NAVFAC

Cost of Drill Ship Modification

6,164,000

Finance

Equity 20% : 1.233

Debt 80% : 4.931

6.164 m

$6.164m \times 1.1 = 6.780m \div 5 = \underline{1.356m}$

Debt: 5 yr 10%

Amort per year = 1.356 m

Cash Flow

YR	0	1	2	3	4	5
AMT	1.233	R-1.356	-	-	-	-

Discount Rate : 12.5%

$$1.233\,m = \int^{n=5} \frac{(R - 1.356\,m)}{(1 + .125)^n}$$

$$1.233\,M = 3.56\,(R - 1.356\,M)$$

$$.346\,M = R - 1.356\,M$$

$$R = 1.702\,M/YR = \$\underline{4663/DAY}$$

Add: 2 Aenko Winches
1 Powered Cable Reel
1 Camera Sled + TV System

Cost = $385,772.
R: 106,543/YR = $292/DAY

Total:
Cost: 6,549,772.
R = 1,808,543/YR = $4955/DAY

(2) PENCO WINCHES INCL (2) 250 HP DIESEL ENGINES @80,200 160 400

(1) POWERED CABLE REEL 45,000

(1) CAMERA SLED & TV SYSTEM DECK MOUNTED 90,000

+ INSTALLATION

WELD PADEYES TO DECK & INSTALL
PENCO WINCHES
16 PADEYES 1" x 12" x 12" = 16 # @ 42#/ft = 672#
@ .30 = 210 –

LABOR 200 HRS + INSTALL 150 40

WELD PADEYES TO DECK & INSTALL
POWERED CABLE REEL (INCL. ELECT REEL)
8 PADEYES 100 HRS 105 –
50 20

WELD PADEYES TO DECK & INSTALL
TV STATION ON DECK –
PROVIDE ELECTRICAL OUTLET. 200 HRS 300 –

= + 23,686 = + 6.54153%

Σ = 362,086 385,772.

385,772 + 38,577 = 424,349 ÷ 5 = 84,870/YR

FINANCE		A	B
EQUITY =	20% =	72,420.	77,155
DEBT =	80%	289,666	212511

DEBT 5 YR 10% AMORT PER YEAR = 362 086 + 36,209 = 398,295 ÷ 5 = 79659/YR

REVENUE = R

AMORT = 79659 84870

$$NCF = \frac{R - 84870}{R - 79659}$$

DISC RATE: 12.5%

$$72{,}420 = \sum^{n=5} \frac{(R-79659)}{(1.125)^n} = 3.56(R-79659)$$

$$77{,}155 = \sum^{n=5} \frac{R-84870}{(1+.125)^n} = 3.56(R-84870)$$

$$21{,}673 = R - 84{,}870$$

$R = 106,543/YR = 292^{90}/DAY$

$$\frac{72\,420}{3.56} = R - 79{,}659$$

$$20343 = R - 79\,659$$

$R = 100,002/YR = 275^{00}/DAY$

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CHECKED BY: ESTIMATE SHEET SHEETS ___ SHEET NO. ___

DATE 5-10-78 TITLE NAVFAC

DESCRIPTION	QUAN.	UNITS L	UNITS M	LABOR	MAT'L
CONTRACT PHASE:					
ADD:					
PENKO WINCHES	2		80 200		160,400
INSTALLATION		150	125	300	250
POWERED CABLE REEL	1				45,000
INSTALLATION				150	125
CAMERA SLED & TV SYSTEM	1				90,000
INSTALLATION				200	300
SUB TOTALS				650	296,075
S/Y SERVICES 16% =				104	-
SUB TOTALS				754	296,075
LABOR: 754 HRS @ 25.00 =	18,850				
MATERIAL COST:	296,075				
HANDLING @ 15% =	44,411				
SUB TOTAL	359,336				
S/Y ENGRG 40 HRS @ 21.50 =	860				
GMDI ENGRG. 40 HRS @ 31.00 =	1,240				
GMDI CONSTRUCTION SUPERVISION 20 HRS @ 31.00 =	620				
ODC	30	2750			
TOTAL COST =	362,086				

+8% on mat'l Fee on 296,075 = 23,686

385,772.

CAPITALIZE & AMORTIZE OVER 5 YEAR PERIOD:

GLOMAR V

DAY RATE = 275.00/DAY

APPENDIX W

VENDOR INFORMATION

Vendor Information

Bendix Skagit Cord Letter and

- Spec sheets on MD-97-2M
- Spec sheets on DTW-100

Link Belt ABS Cranes Quotation and Specs

- ABS - 138
- ABS - 218

Tidewater Marine Service Letter

- 194' towing supply vessel
- 218' towing supply vessel

Caterpillar Diesel

- D399 marine propulsion
- D398 marine generator
- D379 marine generator
- 3408 marine generator
- 3406 marine generator

Voith Schneider recommended installation

Elder 10 x 32 six-man living quarters

Microphore sewage system

Bendix

Skagit Corporation

P O Box 151
Sedro-Woolley, Wash 98284
Tel (206) 855-1141

A Subsidiary of
The Bendix Corporation

Global Marine Development Inc.
P. O. Box 3010
Newport Beach, CA 92663

March 16, 1978

Attention: Mr. Jim Schaff
Senior Naval Architect

Letter No: MKT/EP-0577

Dear Mr. Schaff:

Per our telephone conversation of March 15, enclosed please find our Offshore Equipment Catalog, and specification and drawing for the Skagit MD-97-2M winch. Please note this is basic information for our standard equipment and it is subject to modifications required to meet your specifications.

We did discuss a Skagit Model DTW-100 unit; however, upon further investigation it appears as though the MD-97 unit comes closer to your requirements with spooling capabilities of 7,050' of 1-1/4" wire rope. The power package can be supplied to meet your specification; i.e., either diesel hydraulic, electo-hydraulic, or diesel-converter designed to give the required speeds and pulls.

Be advised that it is possible to supply single drum or waterfall designs of this equipment. I might recommend that the waterfall design with reverse lead sheave would allow for the most compact overall design.

Budgetary pricing for the above waterfall winch with any of the power options would vary from $140,000 to $175,000.

If we can be of any further assistance to you, please let me know.

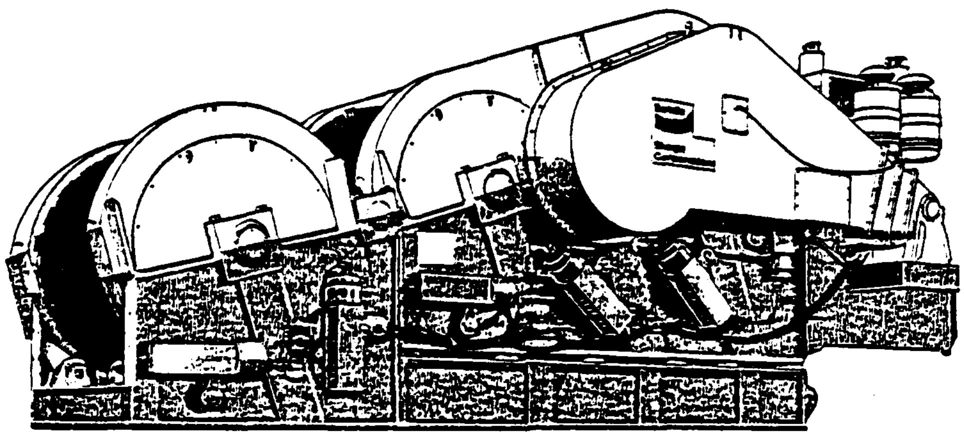
Sincerely yours,

Emery D. Panosh

Emery D. Panosh
General Sales Manager
Offshore & Construction

EDP:ljp
Encls: Offshore Catalog
Spec. No. H-786-13
Dwg. No. 5565440

MD-97
Heavy Duty Hoists



Pulling for you
...with everything we've got

The Skagit Model MD-97 is available in two, three, and four-drum arrangements with waterfall design — the two-drum configuration is standard and weighs approximately 51,000 pounds.

Designed for cable diameters between 1-1/8-inch and 2-inch, the MD-97 will spool 2,750 feet of 2-inch diameter cable. It will produce a line pull of 60,000 pounds at a line speed of 75 feet per minute. When used for anchoring service, the MD-97 has a pulling power of 195,000 pounds maximum on the second wrap with 225,000 pounds of brake holding power.

Standard brakes are spring-set, air-released; single brakes are standard. Available brake options include spring-set, air-operated and straight air-operated. Double brakes are optional.

Air-operated controls are easy to operate and are conveniently located at a stand-up or seated operator console. Remote control arrangements and enclosed cab versions are also available.

All guards are designed to provide maximum protection for equipment and personnel while retaining easy access features for servicing and maintenance.

Bendix Skagit Corporation

MD-97 Specifications

Drum Size
Flange diameter (inches) 66
Barrel diameter (inches) 26
Barrel length (inches) 46

Cable Capacity
1-1/8-inch (feet) 8,750
1-1/4-inch (feet) 7,080
1-3/8-inch (feet 5,850
1-1/2-inch (feet) 4,900
1-5/8-inch (feet) 4,150
1-3/4-inch (feet) 3,600
1-7/8-inch (feet) 3,150
2-inch (feet) 2,750

Maximum Cable Size
Diameter (inches) 2

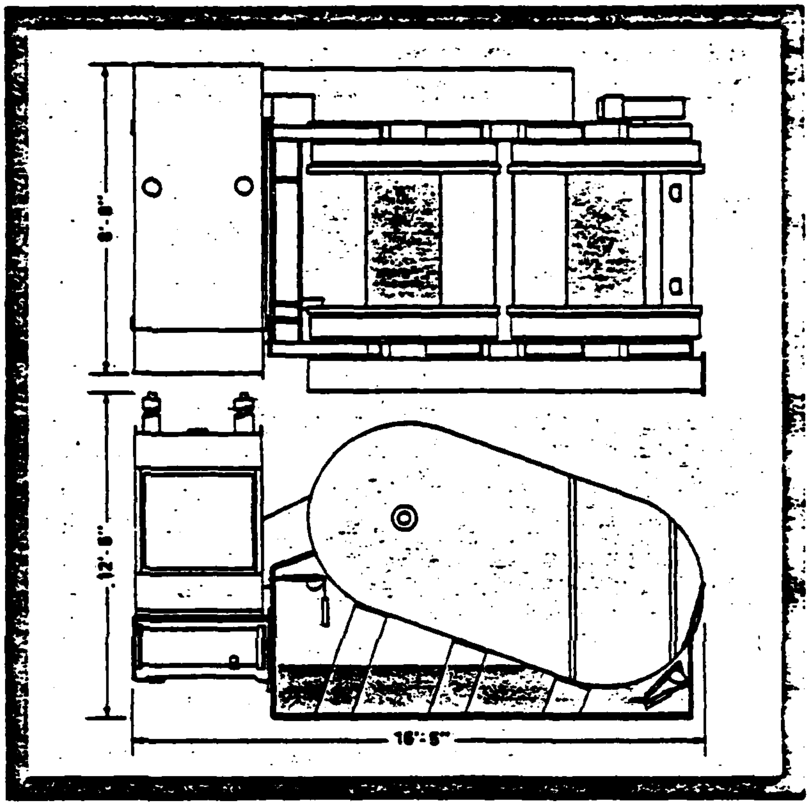
Drum Brake Holding Power
Maximum pounds on second layer .. 225,000

Drum Brake Dimensions
Diameter (inches) 64
Width (inches) 7

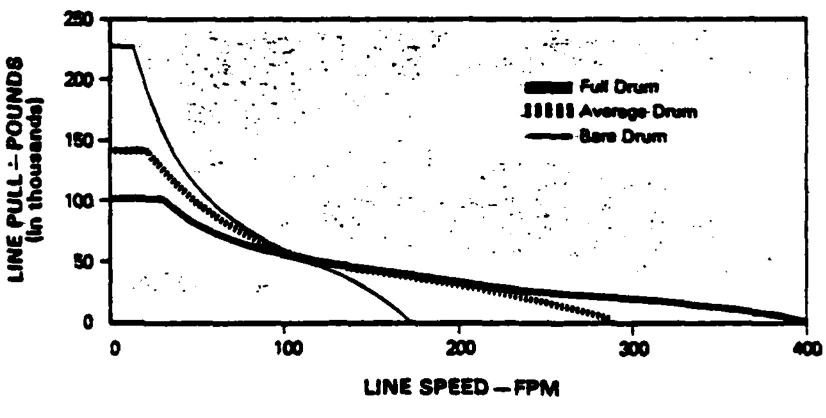
Drum Clutch
A Skagit internal-expanding, air-actuated, band-type clutch is mounted on the drum shaft. The clutch diameter in inches is.... 52

Approximate Weight
Single drum (pounds) 32,000
Double drum — standard (pounds) ... 51,000
Three drum (pounds) 78,000
Four drum (pounds) 114,000

Marine Treatment
Inorganic zinc over sandblasted frame and guards with finish coats of marine machinery epoxy on entire machine.



Performance
Typical single drum line pull in pounds and line speed in feet-per-minute with a Detroit Diesel 8V-71N-N65 diesel engine driving through a TD 10,000/MS470 torque converter with an input ratio of 115/22.



For more information on Skagit's complete line of offshore machinery, contact the factory:

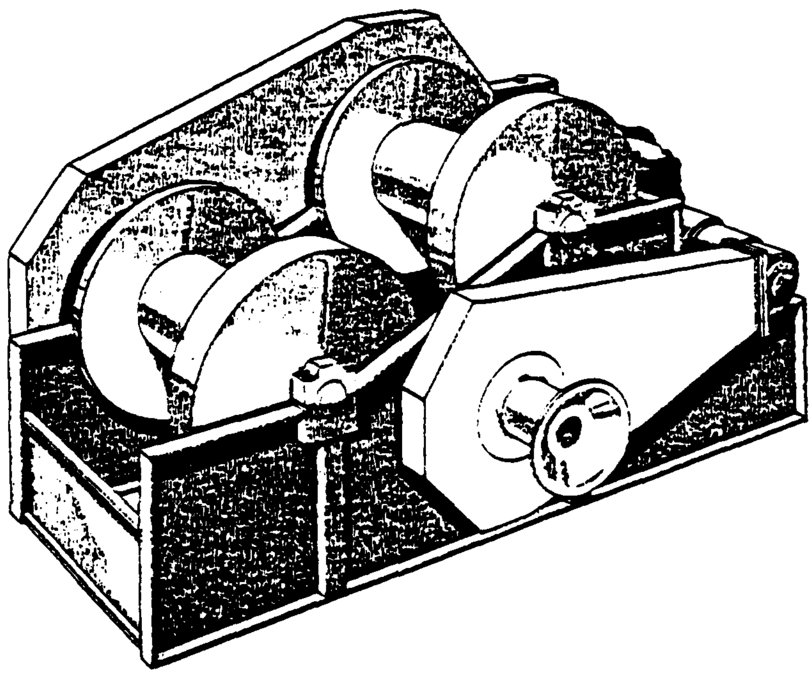
SKAGIT CORPORATION
A Subsidiary of The Bendix Corporation
P.O. Box 151 • Sedro-Woolley, Wash. 98284
Telephone (206) 855-1141 Telex 32-8815

All specifications subject to change without notice.

PRINTED IN U.S.A.
AUGUST [illegible]

DTW-100 Towing Winch

Waterfall



Pulling for you
...with everything we've got

The Skagit Model DTW-100 towing winch is a double-drum unit designed specifically for offshore tow boat and tug operations. It is designed to spool 3,400 feet of 2-inch diameter wire rope on each drum.

Powered by a Detroit Diesel 6V-71 diesel engine driving through a three-speed transmission and torque converter, it can exert 225,000 pounds of pull on the bare drum at stall.

Optionally available for the front drum is a Skagit diamond-screw, offset-roller type levelwind that is mounted on the frame of the unit. The levelwind is chain-driven from the drum and is equipped with a manual clutch for use in phasing the levelwind guide rollers with the rope on the drum.

A spring-set, air-release drum brake measuring 64 inches in diameter and seven inches in width is provided. This brake will hold 300,000 pounds on the first layer of 2-inch wire rope.

The DTW-100 is provided with a stand-up control console featuring the Skagit uni-control for single lever operation. A simple push forward of the combined brake-clutch-throttle lever places the winch in operation. Releasing the spring-loaded lever retards the throttle, disengages the clutch, and applies the brakes. A second lever is provided to control the 3-speed transmission.

Bendix | Skagit Corporation

DTW-100 Specifications

Drum Size

Flange diameter (inches)	72
Barrel diameter (inches)	26
Barrel length (inches)	46

Cable Capacity

2-inch (length in feet)	3,400
1-3/4-inch (length in feet)	4,400

Maximum Cable Size

Diameter (inches)	2

Drum Brake Holding Power

Maximum pounds on first layer	300,000

Drum Brake Dimensions

Diameter (inches)	64
Width (inches)	7

Drum Clutch

An internal-expanding, air-actuated clutch, 52-inch diameter by 7-inch width, is mounted on the drum shaft.

Levelwind (optional)

The levelwind device is optionally available. It is a diamond-screw, offset-roller type, driven by roller chains from a sprocket on the drum. A manual clutch on the worm shaft enables alignment of the vertical guide rollers with the rope on the drum.

Gypsy

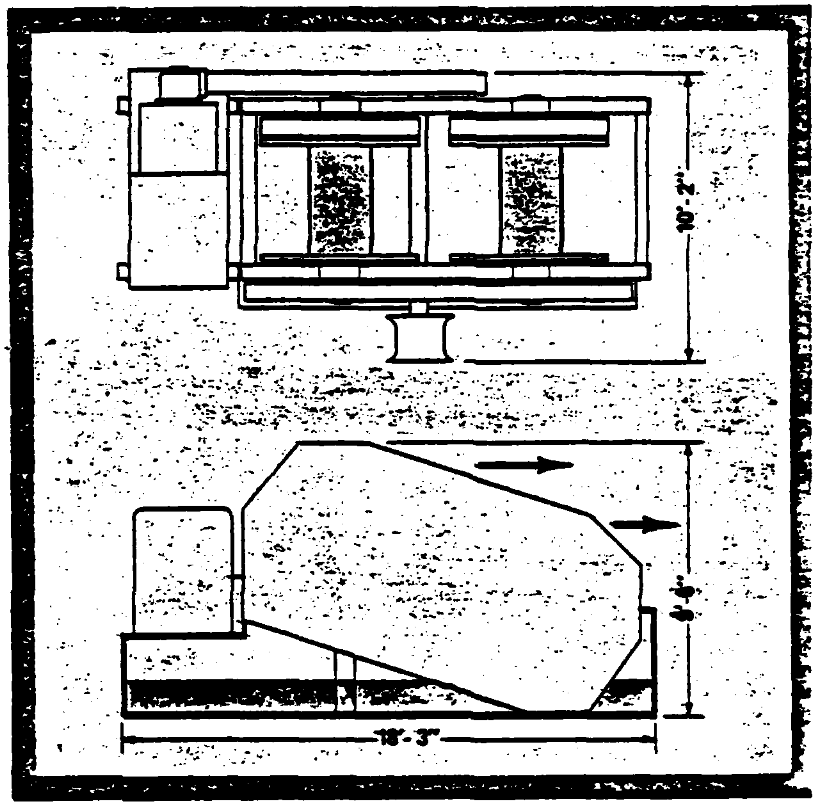
A 20-inch constant turning gypsy is standard on the DTW-100.

Approximate Weight

Double-drum (pounds)	51,000

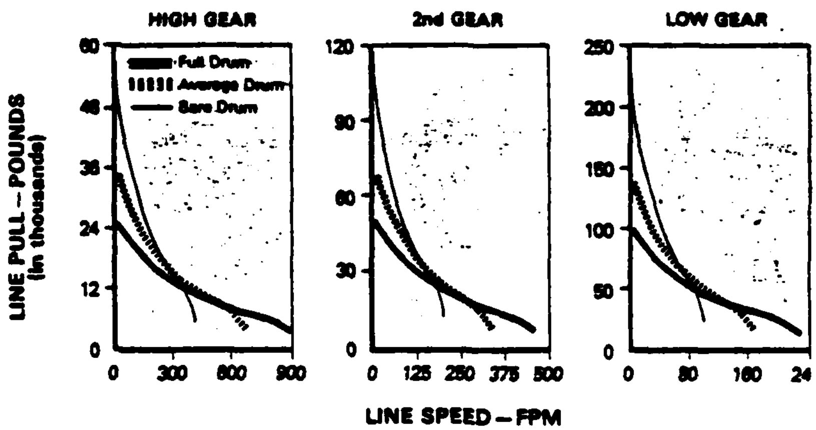
Marine Treatment

Inorganic zinc over sandblasted frame and guards with finish coats of marine machinery epoxy on entire machine.



Performance

Typical single drum line pull in pounds and line speed in feet-per-minute with a Detroit Diesel 6V-71N-N65 diesel engine driving through an Allison TC-550 torque converter and an Allison CRT-5531 three-speed transmission with an input ratio of 138/19.



For more information on Skagit's complete line of offshore machinery, contact the factory:

SKAGIT CORPORATION
A Subsidiary of The Bendix Corporation
P.O. Box 151 • Sedro-Woolley, Wash. 98284
Telephone (206) 855-1141 Telex 32-8815

All specifications subject to change without notice.

PRINTED IN U.S.A.

AUGUST 19??

QUOTATION

No. 1694

MILO EQUIPMENT CORP.

Link-Belt Division

1830 E. Warner Avenue
Santa Ana, California 92705
(714) 546-9160 (213) 924-5408

To GLOBAL MARINE CEVELOPMENT INC.
Knoll Center Newport
4100 MacArthur Boulevard
Newport Beach, CA 92660

ATTN: Mr. James C. Schaff

Date 19 April 1978 Page No. 1

F.O.B. Bowling Green, KY
TERMS: Cash

Prices subject to change without notice

Quantity	Product	Approx. Wt.	Unit Price
1	NEW ABS-138 BASIC CRANE for sea crane mounting with General Motors 4-71N diesel engine and friction clutch, turntable bearing and mounting base, foot throttle, independent boom hoist with low speed planetary drive unit for boom lowering, boom hoist limiting device, swing brake, stainless steel hydraulic lines, power load lowering clutch on rear drum shaft, drum rotation indicators, 100' angle boom with bolted sections, boom angle indicator, five head sheaves boom backstops, all necessary hoist line deflector rollers, fourteen part boom hoist, pendants, 14" front and rear smooth hoist drums, boom live mast, 1,000' 3/4" hoist line, carboline 1,294 acrylic finish coat, catwalk and railings both sides and rear, one 65 ton hook block	65,085#	$141,142.00
	Less Discount		9,174.00
			$131,968.00
	NOTES $6,263.00 is the cost for 50' of boom extension for a ABS-138 Cost of a comparable equipped land crane is $124,082.00 TC-138 FOB factory. $4,161.00 is the cost for 45' of boom extension for a TC-138.		

Accepted by:

Company Date

MILO EQUIPMENT CORPORATION
Link-Belt Division

FORM 8

FMC Corporation
Crane and Excavator Division
Cedar Rapids Iowa 52406

Plants in: Ontario, Canada • Milan, Italy • Queretaro, Mexico

This machine as manufactured conforms with the requirements of ANSI B30.5-1968 and, when equipped with suitable load and angle indicating devices, conforms with THE DEPARTMENT OF LABOR SAFETY AND HEALTH REGULATIONS as listed in the: FEDERAL REGISTER Vol. 37 Nos. 202 and 243 (OSHA)

ABS-138 CRANE CAPACITIES

CRF 8496-11-73 — TABLE A **Refer to ALL notes on next page.**

Based on std. revolving crane upper mounted on appropriate supporting structure; equipped with 18,000# counterweight "A", boom live mast, 1½" dia. boom pendants, and 48" x 48" angle boom with open throat top section — with or without 10,000# capacity (10' 0" long) boom tip extension.

Boom Length	Boom Radius (Feet)	Boom Angle (Degree)	Boom Point Height "W"	Working Load ① With 10,000# Boom Tip Extension	Working Load ① Without 10,000# Boom Tip Extension	Parts of Load Hoist Rope ②	Boom Pendant Lengths ③
	13	78.7	49' 1"	124,300	128,000	10	
	14	77.5	48' 10"	116,000	117,700	10	
	15	76.3	48' 7"	106,800	110,500	9	
	20	70.3	47' 1"	82,300	84,000	7	
50'	25	64.1	45' 0"	63,800	65,500	6	30' 0"
	30	57.5	42' 1"	51,000	52,700	5	
	35	50.4	38' 7"	42,100	43,800	4	
	40	42.5	33' 9"	35,500	37,200	3	
	50	20.5	17' 6"	26,300	28,000	3	
	15	78.6	59' 0"	108,300	110,000	9	
	20	73.7	57' 7"	81,300	83,600	7	
	25	68.7	55' 10"	63,600	65,300	6	
60'	30	63.4	53' 8"	50,700	52,400	5	40' 0"
	35	57.9	50' 10"	41,800	43,500	4	
	40	52.1	47' 4"	35,200	36,900	3	
	50	38.7	37' 6"	26,100	27,800	3	
	50	18.7	19' 3"	19,500	21,200	3	
	20	76.1	68' 0"	81,400	83,100	7	
	25	71.8	66' 6"	63,200	64,900	6	
	30	67.5	64' 8"	50,400	52,100	5	
70'	35	62.9	62' 4"	41,500	43,200	4	50' 0"
	40	58.2	59' 7"	34,900	36,600	3	
	50	48.0	52' 1"	25,800	27,500	3	
	50	35.7	41' 0"	19,800	21,500	3	
	70	17.3	20' 3"	15,100	16,800	2	
	20	77.3	78' 2"	80,900	82,600	7	
	25	74.2	77' 0"	62,900	64,600	6	
	30	70.4	75' 4"	50,000	51,700	5	
	35	66.5	73' 4"	41,100	42,800	4	
80'	40	62.6	71' 1"	34,600	36,300	3	60' 0"
	50	54.2	65' 0"	25,400	27,100	3	
	60	44.7	58' 3"	19,500	21,200	3	
	70	33.3	44' 0"	15,300	17,000	2	
	80	16.2	22' 3"	11,600	13,300	2	
	20	79.2	88' 6"	80,400	82,100	7	
	25	76.0	87' 4"	62,500	64,200	6	
	30	72.6	85' 10"	49,600	51,300	5	
	35	69.3	84' 2"	40,700	42,400	4	
90'	40	65.8	82' 2"	34,200	35,900	3	70' 0"
	50	58.6	76' 10"	25,100	26,800	3	
	60	50.8	69' 9"	19,100	20,800	3	
	70	42.0	60' 3"	14,900	16,600	2	
	80	31.4	46' 10"	11,800	13,500	2	
	90	15.2	23' 3"	8,800	10,500	2	
	25	77.4	97' 7"	62,100	63,800	5	
	30	74.4	96' 4"	49,200	50,900	5	
	35	71.4	94' 9"	40,300	42,000	4	
	40	68.4	93' 0"	33,800	35,500	3	
100'	50	62.1	88' 4"	24,700	26,400	3	80' 0"
	60	55.4	82' 3"	18,700	20,400	3	
	70	48.1	74' 4"	14,500	16,200	2	
	80	39.8	64' 0"	11,400	13,100	2	
	90	29.7	49' 7"	8,900	10,500	2	
	100	14.4	25' 0"	6,500	8,200	1	
	25	78.5	107' 10"	61,700	63,400	5	
	30	75.9	106' 8"	48,900	50,600	4	
	35	73.2	105' 3"	39,900	41,600	4	
	40	70.4	103' 8"	33,400	35,100	3	
	50	64.8	99' 7"	24,200	25,900	3	
110'	60	58.9	94' 2"	18,200	19,900	3	90' 0"
	70	52.6	87' 4"	14,100	15,800	2	
	80	45.7	78' 9"	11,000	12,700	2	
	90	37.9	67' 7"	8,500	10,200	2	
	100	28.3	52' 2"	6,700	8,400	1	
	110	13.8	26' 2"	4,500	6,200	1	
	30	77.1	117' 0"	48,500	50,200	4	
	35	74.6	115' 8"	39,500	41,200	4	
	40	72.1	114' 3"	32,900	34,600	3	
	50	67.0	110' 6"	23,800	25,500	3	
	60	61.7	105' 8"	17,800	19,500	3	
120'	70	56.2	99' 8"	13,700	15,400	2	100' 0"
	80	50.2	92' 2"	10,600	12,300	2	
	90	43.6	82' 10"	8,100	9,800	2	
	100	36.2	70' 10"	5,600	7,300	1	
	110	27.1	54' 8"	3,900	5,600	1	
	120	13.2	27' 4"	2,600	4,300	1	
	30	78.1	127' 2"	48,000	49,700	4	
	35	75.8	126' 1"	39,000	40,700	4	
	40	73.5	124' 8"	32,500	34,200	3	
	50	68.9	121' 3"	23,400	25,100	3	
	60	64.1	117' 0"	16,800	18,500	2	
130'	70	59.1	111' 6"	12,500	14,200	2	110' 0"
	80	53.8	104' 10"	9,300	11,000	2	
	90	48.1	96' 9"	5,800	7,500	1	
	100	41.8	86' 9"	3,900	5,600	1	
	110	34.7	74' 1"	2,200	3,900	1	
	120	26.0	57' 0"	700	2,400	1	
	130	12.7	28' 6"	—	1,300	1	
	30	78.9	137' 4"	47,500	49,200	4	
	35	76.9	136' 4"	38,600	40,300	4	
	40	74.7	135' 1"	32,100	33,800	3	
	50	70.5	132' 0"	22,900	24,600	3	
	60	66.0	128' 0"	14,800	18,500	2	
	70	61.5	123' 1"	10,700	12,400	2	
140'	80	56.7	117' 1"	6,600	8,300	1	120' 0"
	90	51.7	109' 10"	4,200	5,900	1	
	100	46.2	101' 1"	2,200	3,900	1	
	110	40.3	90' 6"	500	2,200	1	
	120	33.4	77' 2"	—	800	1	
	130	25.0	59' 3"	—	—		
	140	12.2	29' 7"	—	—		
	35	77.7	146' 7"	38,100	39,800	4	
	40	75.8	145' 5"	31,600	33,300	3	
	50	71.8	142' 6"	22,500	24,200	3	
	60	67.7	138' 10"	12,800	14,500	2	
	70	63.5	134' 3"	8,800	10,500	2	
	80	59.2	128' 10"	4,900	6,600	2	
150'	90	54.6	122' 4"	2,500	4,200	1	120' 0"
	100	49.8	114' 7"	600	2,300	1	
	110	44.8	105' 3"	—	500	1	
	120	38.8	94' 1"	—	—	—	
	130	32.3	80' 1"	—	—	—	
	140	24.2	61' 6"	—	—	—	
	150	11.8	30' 8"	—	—	—	

① Load on cargo hook
② Required parts of load hoist rope to handle rated loads.
③ Required boom pendant lengths with or without boom tip extension

(Over)

(Supersedes capacities shown in Flysheet CRF 8384-10-68 and ABS-138 Capacity Table A (CRF 8489-9-73.))

NOTES — Crane Capacities

1. Capacities shown are in pounds and represent maximum allowable loads based on strength capabilities of the machine.
2. Hook block weighing 1,400# has been considered part of the machine. If weight of hook block and/or other suspended load handling gear exceeds 1,400#, working load should be adjusted accordingly.
3. Boom tip shall not be more than 5' below boomfeet.
4. Wire rope used to handle each rated load must be 3/4" dia. with minimum breaking strength of 58,800# and must be used in the number of parts of line indicated.
5. The 23' 0" boom live mast must be used for all capacities on this chart.
6. Maximum capacity of 10' boom tip extension is 10,000# regardles of boom length. This capacity applies only when the 10,000# is within the rated lifting capacity of the machine.
7. *Boom angles shown do not apply when handling loads on boom tip* extension. When lifting loads on the boom tip extension, load radius must be known — do not determine load radius by boom angle.
8. Boom tip extension (10') must be fixed in working position 15° off-set from centerline of boom.
9. Do not lift load on boom tip extension when main cargo hook is in use.
10. These capacities apply to the machine only as originally manufactured and normally equipped by FMC Corporation, Crane & Excavator Division.
11. FMC Corporation assumes no responsibility for proper design and construction of the supporting structure to withstand the loadings imposed by the machine — nor proper attachment of the turntable bearing mounting base on the supporting structure.
12. Loads are within the requirements for certification of the construction and survey of cargo gear on merchant vessels by the American Bureau of Shipping per 1969 revisions.

We are constantly improving our products and therefore reserve the right to change designs and specifications.

FMC Corporation
Crane and Excavator Division
Cedar Rapids Iowa 52406

Plants in: Ontario, Canada • Milan, Italy • Queretaro, Mexico

QUOTATION

No. 1691

MILO EQUIPMENT CORP.

Link-Belt Division

1830 E. Warner Avenue
Santa Ana, California 92705
(714) 546-9160 (213) 924-5408

To GLOBAL MARINE DEVELOPMENT INC.
Koll Center Newport
4100 MacArthur Boulevard
Newport Beach, CA 92660

attn; Mr. James C. Schaff

Date 19 April 1978 Page No. 1

F.O.B. Bowling Green, KY
TERMS: Cash

Prices subject to change without notice

Quantity	Product	Approx. Wt.	Unit Price
1	NEW ABS-218 BASIC CRANE for sea crane mounting with General Motors 6-7IN diesel engine and single stage Allison torque converter, turntable bearing and mounting base, foot throttle, independent boom hoist with low speed planetary drive unit for boom lowering, boom hoist limiting device, swing brake, stainless steel hydraulic lines, power load lowering clutch on rear drum shaft, drum rotation indicators, 100' angle boom with bolted sections, boom angle indicator, five head sheaves, boom backstops, all necessary hoist line deflector rollers, fourteen part boom hoist, pendants 17 ½" front and rear smooth hoist drums, boom live mast, 810' 7/8" hoist line, carboline 1,294 acrylic finish coat, catwalks and railings both sides and rear, 80 ton hook block	75,525#	$165,750.00
	Less Discount		10,774.00
			$154,976.00
	NOTES $6,116.00 is the cost for 50' of boom extension for ABS-218. TC-218A has been up rated to a 100 ton crane. There is none comparable to the ABS-218 at this time. Cost of a TC-218A is $159,557.00 FOB factory. $7,908.00 is the cost for 50' boom extension for TC-218A.		

Accepted by:

Company Date

MILO EQUIPMENT CORPORATION
Link-Belt Division

FORM 8

FMC Corporation
Crane and Excavator Division
Cedar Rapids Iowa 52406

Plants in: Ontario, Canada • Milan, Italy • Queretaro, Mexico

This machine as manufactured conforms with the requirements of: ANSI B30.5-1968 and, when equipped with suitable load and angle indicating devices, conforms with THE DEPARTMENT OF LABOR SAFETY AND HEALTH REGULATIONS as listed in the: FEDERAL REGISTER Vol. 37 Nos. 202 and 243 (OSHA)

ABS-218 CRANE CAPACITIES

CRF 8496-11-73 — TABLE A **Refer to ALL notes on next page.**

Based on std. revolving crane upper mounted on appropriate supporting structure; equipped with 21,000# counterweight "A", boom live mast, 1¾" dia. boom pendants, and 48" x 48" angle boom with open throat top section — with or without 10,000# capacity (10' 0" long) boom tip extension.

* BOOM				WORKING LOAD ①		Parts of Load Hoist Rope ③	Boom Pendant Lengths ③
Length	Radius (Feet)	Angle (Degree)	Point Height "W"	With 10,000# Boom Tip Extension	Without 10,000# Boom Tip Extension		
	13	79.0	49' 1"	151,000	152,700	10	
	14	77.9	48' 11"	141,100	142,800	10	
	15	76.7	48' 8"	132,400	134,100	9	
	20	70.7	47' 2"	100,600	102,300	7	
50'	25	64.5	45' 2"	78,500	80,200	6	30' 0"
	30	58.0	42' 5"	63,000	64,700	5	
	35	50.9	38' 10"	52,200	53,900	4	
	40	43.1	34' 2"	44,200	45,900	4	
	50	21.5	18' 4"	33,200	34,900	3	
	15	78.9	58' 11"	132,000	133,700	9	
	20	74.0	57' 8"	100,200	101,900	7	
	25	69.0	56' 0"	78,300	80,000	6	
60'	30	63.8	53' 10"	62,900	64,500	5	40' 0"
	35	58.3	51' 1"	52,000	53,700	4	
	40	52.5	47' 7"	44,000	45,700	4	
	50	39.2	37' 11"	33,000	34,700	3	
	60	19.7	20' 2"	23,000	24,700	3	
	20	76.4	68' 0"	99,800	101,500	7	
	25	72.1	66' 7"	77,900	79,600	6	
	30	67.8	64' 9"	62,400	64,100	5	
70'	35	63.3	62' 6"	51,700	53,400	4	50' 0"
	40	58.6	59' 9"	43,600	45,300	4	
	50	48.4	52' 4"	32,700	34,400	3	
	60	38.2	41' 4"	25,500	27,200	3	
	70	18.2	21' 10"	18,000	19,700	2	
	20	78.1	78' 4"	99,300	101,000	7	
	25	74.4	77' 1"	77,600	79,300	6	
	30	70.7	75' 6"	62,000	63,800	5	
	35	66.8	73' 6"	51,300	53,000	4	
	40	52.9	71' 2"	43,300	45,000	4	
80'	50	54.5	65' 1"	32,400	34,100	3	60' 0"
	60	45.1	56' 8"	25,200	26,900	3	
	70	33.8	44' 6"	20,200	21,800	2	
	80	17.0	23' 5"	14,100	15,800	2	
	20	79.4	98' 5"	98,700	100,400	7	
	25	76.2	87' 5"	77,100	78,800	6	
	30	72.9	86' 0"	61,600	63,300	5	
	35	69.5	84' 4"	50,900	52,600	4	
90'	40	66.1	82' 3"	43,000	44,700	3	70' 0"
	50	58.9	77' 1"	32,000	33,700	3	
	60	51.1	70' 1"	24,800	26,500	3	
	70	42.4	60' 8"	19,800	21,500	2	
	80	31.8	47' 5"	16,000	17,700	2	
	90	16.0	24' 10"	11,000	12,700	2	
	25	77.6	97' 8"	76,700	78,400	6	
	30	74.6	96' 5"	61,200	62,900	5	
	35	71.6	94' 11"	50,500	52,200	4	
	40	68.6	93' 1"	42,600	44,300	3	
100'	50	62.3	88' 6"	31,600	33,300	3	80' 0"
	60	55.6	82' 5"	24,400	26,100	3	
	70	48.3	74' 8"	19,400	21,100	2	
	80	40.1	64' 5"	15,600	17,300	2	
	90	30.1	50' 2"	12,700	14,400	2	
	100	15.2	26' 3"	8,600	10,300	1	
	25	78.7	107' 11"	76,300	78,000	6	
	30	76.1	106' 9"	60,800	62,500	5	
	35	73.4	105' 5"	50,000	51,800	4	
	40	70.6	103' 9"	42,200	43,900	3	
	50	65.0	99' 8"	31,200	32,900	3	
110'	60	59.1	94' 5"	24,000	25,700	3	90' 0"
	70	52.8	87' 7"	19,000	20,700	2	
	80	45.9	79' 0"	15,200	16,900	2	
	90	38.2	67' 11"	12,300	14,000	2	
	100	28.7	52' 10"	10,000	11,700	2	
	110	14.5	27' 6"	6,400	8,100	1	
	30	77.2	117' 0"	60,300	62,000	5	
	35	74.8	115' 10"	49,600	51,300	4	
	40	72.3	114' 4"	41,800	43,500	3	
	50	67.2	110' 7"	30,800	32,500	3	
	60	61.9	105' 10"	23,500	25,200	3	
120'	70	56.3	98' 11"	18,600	20,300	2	100' 0"
	80	50.4	92' 5"	14,800	16,500	2	
	90	43.9	83' 2"	11,900	13,600	2	
	100	36.5	71' 4"	9,600	11,300	2	
	110	27.4	55' 4"	7,800	9,500	1	
	120	13.9	28' 3"	4,500	6,200	1	
	30	78.2	127' 2"	59,900	61,600	5	
	35	76.0	126' 2"	49,200	50,900	4	
	40	73.7	124' 9"	41,300	43,000	3	
	50	69.0	121' 5"	30,300	32,000	3	
	60	64.2	117' 1"	23,100	24,800	3	
130'	70	59.2	111' 8"	18,200	19,900	2	110' 0"
	80	54.0	105' 1"	14,400	16,100	2	
	90	48.3	97' 0"	11,500	13,200	2	
	100	42.1	87' 1"	9,200	10,900	2	
	110	35.0	74' 7"	7,400	9,100	1	
	120	26.3	57' 8"	5,800	7,500	1	
	130	13.3	30' 0"	2,900	4,600	1	
	30	79.1	137' 8"	59,400	61,100	5	
	35	77.0	136' 5"	48,700	50,400	4	
	40	74.9	135' 2"	40,900	42,500	3	
	50	70.6	132' 1"	29,900	31,600	3	
	60	66.2	128' 1"	22,700	24,400	3	
	70	61.6	123' 2"	17,300	19,500	2	
140'	80	56.9	117' 3"	14,000	15,700	2	120' 0"
	90	51.8	110' 1"	11,100	12,800	2	
	100	46.4	101' 5"	8,900	10,600	1	
	100	40.5	90' 10"	7,000	8,700	1	
	120	33.7	77' 8"	5,400	7,100	1	
	130	25.4	60' 0"	4,000	5,700	1	
	140	12.8	31' 1"	1,400	3,100	1	
	35	77.9	146' 9"	48,300	50,000	4	
	40	75.9	145' 6"	40,500	42,200	3	
	50	71.9	142' 7"	29,400	31,100	3	
	60	67.9	138' 11"	22,200	23,900	3	
	70	63.7	134' 5"	17,300	19,000	2	
	80	59.3	129' 0"	13,500	15,200	2	
150'	90	54.8	122' 7"	10,600	12,300	2	130' 0"
	100	50.0	114' 10"	8,500	10,200	1	
	110	44.8	105' 8"	6,600	8,300	1	
	120	39.0	94' 6"	5,000	6,700	1	
	130	32.5	80' 7"	3,700	5,400	1	
	140	24.5	62' 2"	2,300	4,000	1	
	150	12.4	32' 3"	—	1,800	1	

① Load on cargo hook
② Required parts of load hoist rope to handle rated loads.
③ Required boom pendant lengths with or without boom tip extension.

(Over)

(Supersedes capacities shown in Flysheet CRF 8384-10-68 and ABS-218 Capacity Table A #CRF 8489-9-73.)

NOTES — Crane Capacities

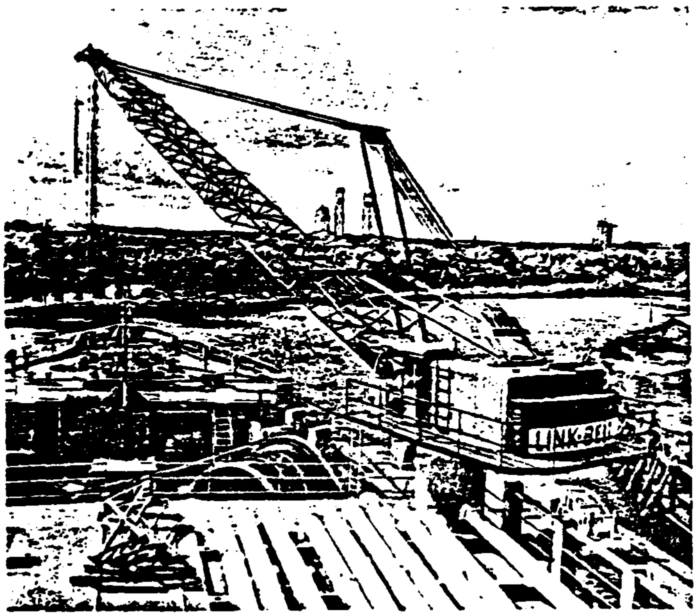
1. Capacities shown are in pounds and represent maximum allowable loads based on strength capabilities of the machine.
2. Hook block weighing 1,400# has been considered part of the machine. If weight of hook block and/or other suspended load handling gear exceeds 1,400#, working load should be adjusted accordingly.
3. Boom tip shall not be more than 5' below boomfeet.
4. Wire rope used to handle each rated load must be 7/8" dia. with minimum breaking strength of 69,200# and must be used in the number of parts of line indicated.
5. The 24' 0" boom live mast must be used for all capacities on this chart.
6. Maximum capacity of 10' boom tip extension is 10,000# regardless of boom length. This capacity applies only when the 10,000# is within the rated lifting capacity of the machine.
7. Boom angles shown do not apply when handling loads on boom tip extension. When lifting loads on the boom tip extension, load radius must be known — do not determine load radius by boom angle.
8. Boom tip extension (10') must be fixed in working position 15° offset from centerline of boom.
9. Do not lift load on boom tip extension when main cargo hook is in use.
10. These capacities apply to the machine only as originally manufactured and normally equipped by FMC Corporation, Crane & Excavator Division.
11. FMC Corporation assumes no responsibility for proper design and construction of the supporting structure to withstand the loadings imposed by the machine — nor proper attachment of the turntable bearing mounting base on the supporting structure.
12. Loads are within the requirements for certification of the construction and survey of cargo gear on merchant vessels by the American Bureau of Shipping per 1969 revisions.

We are constantly improving our products and therefore reserve the right to change designs and specifications.

FMC Corporation
Crane and Excavator Division
Cedar Rapids Iowa 52406

Plants in: Ontario, Canada • Milan, Italy • Queretaro, Mexico

LINK-BELT "ABS/API" PEDESTAL MOUNTED CRANES FLYSHEET



SPECIFICATIONS FOR

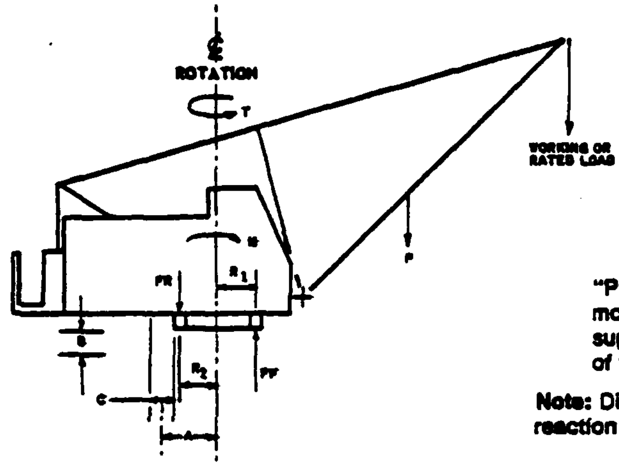
ABS/API Models 48A, 78A, 108B, 138, 218, 238

Design as Approved and Accepted by American Bureau of Shipping

Flysheet CRF 8496-11-73

(Supersedes Sea-Crane Flysheet CRF 8364-10-68
and ABS/API Flysheet CRF 8489-9-73)

Printed in U.S.A.



"Proper construction of — and connection of mounting plate and/or mounting base to — supporting structure shall be the responsibility of the owner."

Note: Direction of arrows at "FF" and "FR" denotes reaction for support of revolving superstructure.

MAXIMUM LOAD VALUES & REACTION LOCATIONS — ABS Models Only

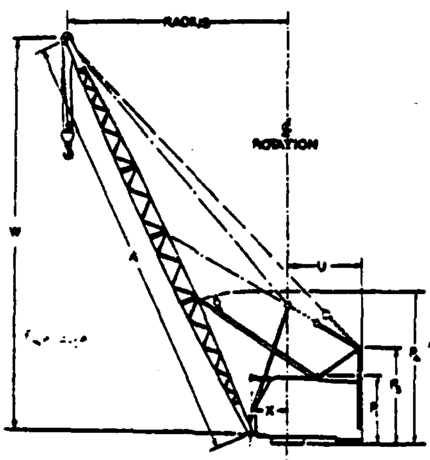
		48A	78A	108B	138	218	238
Front reaction (lbs.)	FF	137,900	246,700	275,400	437,000	503,100	740,900
Rear reaction (lbs.)	FR	88,300	170,500	198,600	306,000	344,900	542,400
Moment @ C/L rotation (ft. lbs.)	M	362,000	752,600	980,700	1,471,900	1,753,000	2,558,000
Torsional load (ft. lbs.)	T	27,600	41,500	59,600	73,500	97,900	125,700
Thrust (lbs.)	P	57,600	107,200	128,800	180,400	218,100	329,400
Reaction location (ft.)	R_1	1.60′	1.82′	2.08′	2.0′	2.09′	2.0′
Reaction location (ft.)	R_2	1.60′	1.82′	2.08′	2.0′	2.09′	2.0′

MAXIMUM LOAD VALUES & REACTION LOCATIONS — API Models Only

		48A	78A	108B	138	218	238
Front reaction (lbs.)	FF	183,400	347,500	421,000	581,200	669,100	740,900
Rear reaction (lbs.)	FR	132,400	221,000	263,400	459,000	517,300	542,400
Moment @ C/L rotation (ft. lbs.)	M	504,800	985,400	1,420,500	2,069,400	2,473,100	2,558,200
Torsional load (ft. lbs.)	T	27,600	41,500	59,600	73,500	97,900	125,700
Thrust (lbs.)	P	66,000	130,000	176,300	194,200	260,900	330,400
Reaction location (ft.)	R_1	1.60′	1.82′	2.08′	2.0′	2.09′	2.0′
Reaction location (ft.)	R_2	1.60′	1.82′	2.08′	2.0′	2.09′	2.0′

MINIMUM CLEARANCE DIMENSIONS — For removing vertical swing shaft

		48A	78A	108B	138	218	238
C/L rotation to C/L swing shaft	A	16″	19½″	21½″	38″	41″	41″
Clearance under mounting plate required to remove vertical swing shaft	B	21½″	26″	32″	12½″	12¾″	15¾″
Diameter of swing pinion	C	8″	10½″	10″	10″	10″	9¼″



GENERAL DIMENSIONS

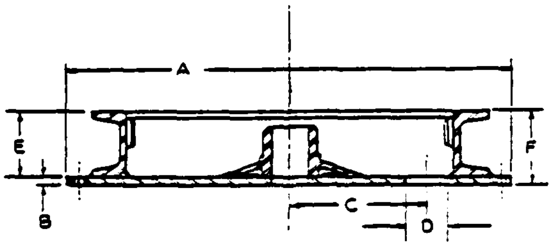
		48A	78A	108B	138	218	238
Basic angle boom length	A	25′	35′	40′	50′	50′	50′
Over-all height, low gantry ①	P_1	7′ 1″	8′ 2″	8′ 6″	7′ 6½″	7′ 11″	8′ 2″
Over-all height, retractable gantry raised①	P_1	NA	11′ 4″	12′ 0″	NA	NA	NA
Over-all height, boom live mast vertical①	P.	14′ 4″	NA	NA	27′ 10″	28′ 2″	34′ 9″
Radius of boom hinge pin	X	2′ 8″	3′ 1″	3′ 2″	3′ 2″	3′ 6″	3′ 6″

① Measured from bottom of roller path mounting plate (78A and 108B) or from bottom of turntable bearing mounting base or mounting plate (48A, 138, 218, and 238).

HOOK ROLLER PATH MOUNTING DIMENSIONS

		78A	108B
Length & width hook roller path mounting plate*	A	65 1/4" diameter 59" x 67 3/4"	72" diameter 65" x 74"
Thickness hook roller path mounting plate	B	1 1/4"	1 1/4"
C/L rotation to C/L swing pinion access hole	C	19 1/2"	21 1/2"
Diameter swing pinion access hole	D	10 1/2"	10"
Over-all height of roller path	E	9 21/32"	10 3/4"
Over-all height roller path & mounting plate	F	10 29/32"	12"

*Upper figure indicates bolt-on unit; lower figure indicates weld-on unit.

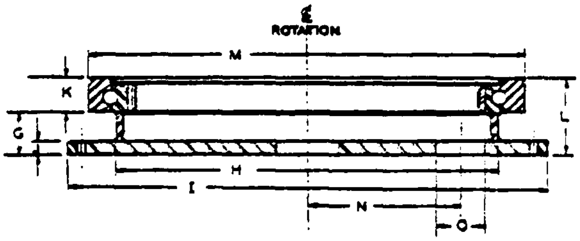


Models 78A & 108B

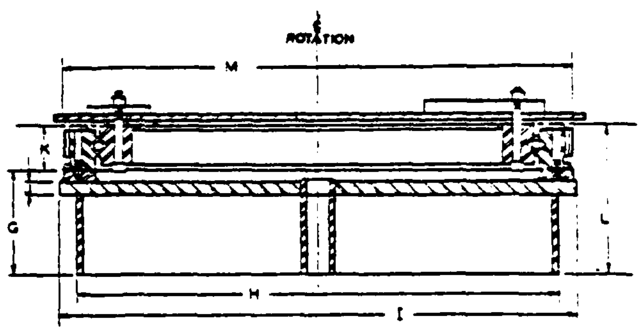
TURNTABLE BEARING MOUNTING DIMENSIONS

		48A	138	218	238
Over-all height turntable brg. mounting base	G	4 3/4"	15 3/4"	15 3/4"	15 3/4"
Diameter turntable bearing mounting base	H	42 1/16"	65 1/4"	71"	71"
Diameter turntable bearing mounting plate	I	53"	70"	76 1/2"	76 1/2"
Thickness turntable bearing mounting plate	J	1 1/2"	2"	2"	2"
Over-all height turntable bearing only	K	3 3/4"	5 3/4"	6 1/2"	6 1/2"
Over-all height bearing and mounting	L	8 1/2"	21 1/2"	22 1/4"	22 1/4"
Diameter turntable bearing	M	48 1/8"	69"	75 1/4"	75"
C/L rotation to C/L swing pinion access hole	N	16"	①	①	①
Diameter swing pinion access hole	O	8"	①	①	①

① Equipped with external ring gear and swing pinion.



Model 48A



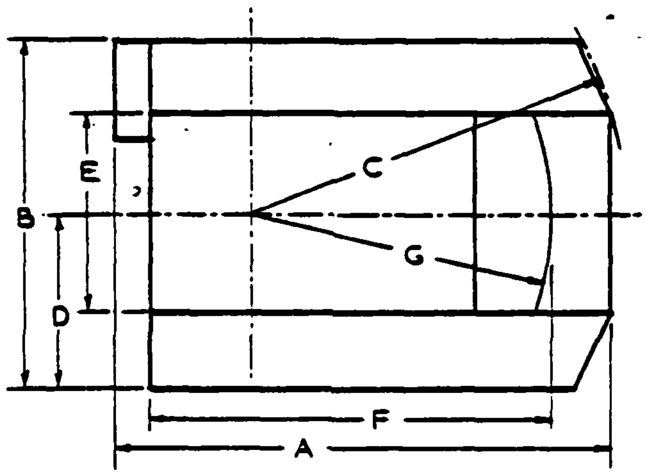
Models 138, 218 & 238

GROSS OPERATING WEIGHT — (Approximate.) Standard machines equipped with basic length boom, standard counterweight, diesel engine, retractable high gantry, and/or boom live mast, boom stops, catwalks both sides and rear, but no hook block.

48A	78A	108B	138	218	238
22,410#	40,485#	51,675#	60,300#	69,185#	105,220#

DIMENSIONS OF REVOLVING CRANE UPPER LESS BOOM

		48A	78A	108B	138	218	238
Over-all length with catwalk	A	13' 10"	16' 10"	18' 3"	21' 1 1/8"	21' 5"	21' 6"
Over-all width with catwalk	B	12' 3"	13' 0"	13' 2 1/4"	15' 8"	15' 8"	15' 8"
Tailswing of catwalk	C	11' 6"	13' 3"	14' 2"	16' 5"	16' 11"	16' 11"
C/L rotation to outside of catwalk	D	6' 1 1/2"	6' 6"	6' 7 1/8"	8' 1"	8' 1"	8' 1"
Over-all width without catwalk	E	7' 6"	7' 10"	8' 0"	10' 6"	10' 6"	10' 6"
Over-all length without catwalk	F	11' 8 13/16"	14' 3 1/8"	15' 1 1/8"	17' 11 5/8"	18' 3 1/2"	18' 6 1/2"
Tailswing of counterweight only	G	8' 9"	10' 6 1/2"	11' 5"	13' 5"	14' 0"	14' 4"



GENERAL SPECIFICATIONS (Applicable to both ABS and API machines unless noted otherwise).

UPPER

UPPER FRAME — All-welded, stress relieved, precision machined.

UPPER MACHINERY SIDE HOUSINGS — All-welded, stress relieved, and line bored for positive shaft and gear alignment. Depending on specific model, side housings may be either fabricated integrally with upper frame or as separate units which bolt on machined surfaces on upper frame.

MOUNTING OF UPPER ON SUPPORTING STRUCTURE — ROLLER PATH WITH INTEGRAL RING (SWING) GEAR — Double-flanged, machined roller path, welded to mounting plate which is fixed to supporting structure. Internal ring (swing) gear cast integral with roller path, and swing pinion meshes with this ring gear. Standard on 78A and 108B.

TURNTABLE ROLLERS — Heat treated, conical hook-type rollers mounted on anti-friction bearings; shim adjusted to compensate for roller path or roller wear. Eight rollers mounted in four equalized pairs — two front and two rear. Standard on 78A and 108B.

TURNTABLE BEARING WITH INTEGRAL RING (SWING) GEAR — Outer race of bearing bolted to upper revolving frame; inner race bolted to mounting plate which is either fixed to supporting structure or to mounting base which is fixed to supporting structure. Integral ring (swing) gear may be either internal or external of bearing, depending on model, and swing pinion meshes with this ring gear. Standard on 48A, 138, 218, and 238.

TRANSMISSION — Link-Belt roller chain enclosed in chain case; pump-driven oil stream lubrication. Engine pinion and chain wheel have machine-cut teeth.

REDUCTION SHAFT — Mounted in side housings on anti-friction bearings.

Drive Pinions — Two heat-treated, machine-cut tooth pinions; involute splined to reduction shaft.

CLUTCHES — Speed-o-Matic power hydraulic actuated for all functions other than engine master clutch. Internal expanding, 2-shoe type; aluminum alloy shoes.

CLUTCH DRUM SIZE	48A	78A	108B	138	218	238
Front drum	14" x 3½"	18" x 4½"	20" x 5"	18" x 4½"	20" x 5"	23" x 6"
Rear drum	14" x 3½"	18" x 4½"	20" x 5"	18" x 4½"	20" x 5"	23" x 6"
Swing	14" x 3½"	18" x 4½"	20" x 5"	18" x 4½"	20" x 5"	23" x 6"
Boom hoist	14" x 3½"	18" x 4½"	20" x 5"	18" x 4½"	20" x 5"	23" x 6"
Boom lowering	14" x 3½"	18" x 4½"	20" x 5"	18" x 4½"②	20" x 5"②	23" x 6"②
Third drum hoist①	NA	17¼" x 4"	17¼" x 4"	18" x 4½"③	20" x 5"③	23" x 6"③
Load lowering	14" x 3½"④	18" x 4½"⑤	20" x 5"⑤	18" x 4½"⑥	20" x 5"⑥	23" x 6"④

① Optional equipment.
② Low-speed planetary drive unit standard for boom lowering; high-speed power boom lowering clutch optional.
③ Optional load lowering clutch of same size available.
④ Optional on front and rear drums.
⑤ Standard on front and rear drums.
⑥ Standard on rear drum; same size optional for front drum.

DRUMS — Front and rear main, and optional third, operating drums.

Shafts — Mounted in line bores on anti-friction bearings. Front and rear drum shafts (only) extended to accommodate power load lowering clutches. Special front and rear drum shafts required on 78A, 108B, 138, 218 and 238 to accommodate optional high-speed planetary drive units.

Spur Gears — Machine-cut teeth; mounted on anti-friction bearings on shafts.

Clutch Drums — Bolted to spur gears.

Brakes — Two-piece, external contracting band; mechanically foot-pedal-operated on front, rear, and optional third operating drums.

BRAKE DRUM SIZE	48A	78A	108B	138	218	238
Front Drum	18" x 3"	23" x 4¼"	27" x 4½"	32" x 4½"	34" x 5"	34" x 5½"
Rear Drum	18" x 3"	23" x 4¼"	27" x 4½"	32" x 4½"	34" x 5"	34" x 5½"
Third Drum	18" x 3"	18" x 3½"	18" x 3½"	26" x 4½"	28" x 5"	28" x 5½"

Brake Drums — Involute splined to shaft.

Drum Laggings — Models 48A, 78A, and 108B — Two-piece, removable laggings bolted to brake drum and clamped to shaft. Models 138, 218, and 238 — one-piece laggings involute splined to shaft. Smooth laggings on front and rear drums — standard on all models.

Drum Rotation Indicators — Standard for both front and rear main operating drums on all models. Dials mounted on front of control stand actuated by flexible shaft drives attached to drum shafts.

TWO-SPEED FRONT AND REAR DRUMS —

Gear-Driven (Hoist only) — Intermediate gears installed in side housings convert 2-shoe load lowering clutches to high-speed hoist clutches; hoist rope speed increased 100% over standard speeds. Availability — optional only on 78A and 108B; not available if machine equipped with load lowering clutches or auxiliary 2-shoe rear drum brake.

PLANETARY DRIVE UNITS FOR FRONT AND REAR DRUMS — Planetary drive unit mounts between spur gear and 2-shoe clutch drum on extended shaft; provides 70% increase or 40% decrease of standard load hoist and/or load lowering rope speeds. Not available on 78A or 108B when equipped with gear-driven hoist drum.

Availability —

FUNCTION	48A	78A	108B	138	218	238
Front drum hoist	NA	Optional	Optional	Optional	Optional	Optional
Front drum lowering	NA	NA	NA	Optional	Optional	Optional
Rear drum hoist	NA	Optional	Optional	Optional	Optional	Optional
Rear drum lowering	NA	Optional	Optional	Optional	Optional	Optional

Note: Planetary drive units not available for third operating drum on any model.

AUXILIARY 2-SHOE REAR DRUM BRAKE — Optional; available only on 78A and 108B. Increases brake lining contact area by 212 sq. in. Pressure on mechanical brake pedal applies the standard rear drum brake band and the auxiliary 2-shoe brake simultaneously. Mechanical linkage actuates the control mechanism of a variable pressure valve to direct hydraulic pressure to the brake cylinder.

Note: Power load lowering clutch, 2-speed gear-driven hoist, or 2-speed planetary drive unit on lowering (left) side for rear drum not available on machine equipped with auxiliary 2-shoe drum brake.

DRUM WIRE ROPE CAPACITIES, LINE SPEED AND PULL — Available line pull, not based on wire rope strength.

FRONT DRUM	48A	78A		108B		138	218	238
Root diameter	8 1/2"	12"	12"④	13 1/4"	13 1/4"④	14"	17 1/4"	17 1/4"
Lagging type	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth
Wire rope diameter	1/2"	5/8"	5/8"	3/4"	3/4"	3/4"	7/8"	1"
FIRST LAYER WIRE ROPE —								
Line speed — f.p.m.①	150	152	152	146	146	162	180	171
Line pull — lbs.①	11,100	16,310	16,310	23,000	23,000	20,200	21,300	26,100
Line speed — f.p.m.②	NA	304	304	292	292	NA	NA	NA
Line pull — lbs.②	NA	7,650	7,650	11,160	11,160	NA	NA	NA
Line speed — f.p.m.③	NA	NA	NA	248	248	276	306	291
Line pull — lbs.③	NA	NA	NA	12,790	12,790	11,200	11,830	14,500
Wire rope capacity	31′	57′	57′	54′	54′	77′	102′	88′
LAST LAYER WIRE ROPE —								
Line speed — f.p.m.①	248	242	257	240	272	311	287	283
Line pull — lbs.①	6,742	10,230	9,630	14,000	12,400	10,500	13,500	15,700
Line speed — f.p.m.②	NA	484	514	480	544	NA	NA	NA
Line pull — lbs.②	NA	4,800	4,250	6,700	6,020	NA	NA	NA
Line speed — f.p.m.③	NA	NA	NA	408	462	529	488	481
Line pull — lbs.③	NA	NA	NA	7,700	6,890	5,840	7,500	8,720
Maximum layers wire rope	7	7	8	7	9	10	7	7
Maximum wire rope capacity	292′	543′	645′	481′	661′	1,071′	892′	790′

① Standard machine-crane lagging.
② Machine equipped with gear-driven, high-speed drum.
③ Machine equipped with planetary-driven, high-speed drum.
④ Optional high flange, high wire rope capacity crane lagging.

DRUM WIRE ROPE CAPACITIES, LINE SPEED AND PULL — Available line pull, not based on wire rope strength.

REAR DRUM	48A	78A	108B	138	218	238
Root diameter	8 1/2"	14"④	13 1/4"	14"	17 1/4"	17 1/4"
Lagging type	Smooth	Grooved	Smooth	Smooth	Smooth	Smooth
Wire rope diameter	1/2"	3/4"④	3/4"	3/4"	7/8"	1"
FIRST LAYER WIRE ROPE —						
Line speed — f.p.m.①	150	178	149	162	180	171
Line pull — lbs.①	10,800	13,550	22,545	20,200	21,300	26,100
Line speed — f.p.m.②	NA	356	298	NA	NA	NA
Line pull — lbs.②	NA	6,360	10,895	NA	NA	NA
Line speed — f.p.m.③	NA	NA	253	276	306	291
Line pull — lbs.③	NA	NA	12,469	11,200	11,830	14,500
Wire rope capacity	31′	49′	54′	77′	102′	88′
LAST LAYER WIRE ROPE —						
Line speed — f.p.m.①	248	250	245	311	287	283
Line pull — lbs. ①	6,540	9,650	13,627	10,500	13,500	15,700
Line speed — f.p.m.②	NA	500	480	NA	NA	NA
Line pull — lbs. ②	NA	4,530	6,600	NA	NA	NA
Line speed — f.p.m.③	NA	NA	408	529	488	481
Line pull — lbs.③	NA	NA	7,550	5,840	7,500	8,720
Maximum layers wire rope	7	5	7	10	7	7
Maximum wire rope capacity	401′	319′	481′	1,071′	892′	790′

① Standard machine-crane lagging.
② Machine equipped with gear-driven, high-speed drum.
③ Machine equipped with planetary-driven, high-speed drum.
④ Required when using 10′ boom tip extension.

DRUM WIRE ROPE CAPACITIES, LINE SPEED AND PULL — Available line pull, not based on wire rope strength.

THIRD DRUM	78A	108B	138	218	238
Root diameter	9″	9″	10½″	11¼″	12¼″
Lagging type	Grooved	Grooved	Smooth	Smooth	Smooth
Wire rope diameter	⅝″	⅝″	¾″	¾″	⅞″
FIRST LAYER WIRE ROPE —					
Line speed — f.p.m.①	116	120	131	132	136
Line pull — lbs.①	10,000	10,000	22,800	25,900	30,800
Wire rope capacity	33′	35′	60′	80′	74′
LAST LAYER WIRE ROPE —					
Line speed — f.p.m.①	191	197	201	198	208
Line pull — lbs.①	6,000	6,000	14,800	17,200	20,100
Maximum layers wire rope	6	6	5	5	5
Maximum wire rope capacity	278′	297′	370′	495′	460′

① Standard machine-crane lagging.

INDEPENDENT BOOMHOIST — Spur gear-driven with precision boom raising and lowering controlled through Speed-o-Matic power hydraulic 2-shoe clutches — standard on models 48A, 78A, and 108B. Same applies to models 138, 218, and 238 with this exception — Standard boom lowering controlled through low-speed planetary drive unit with optional high-speed boom lowering clutch optional.

Shaft — Mounted in line bore on anti-friction bearings.

Spur Gears — Machine-cut teeth; mounted on anti-friction bearings on shaft.

Wire Rope Drum — Involute splined to shaft; grooved drums on 78A and 108B, smooth drums on other models.

Brake — External contracting band; spring applied and power hydraulically released.

Planetary Boom Lowering — Models 138, 218, and 238 only. Standard — unit mounts on outer end of boomhoist shaft. Planetary actuated by external contracting band brake which is controlled by operator from operator's control stand.

High-speed Boom Lowering Clutch — Optional for models 138, 218, and 238 only. Two-shoe clutch splined to shaft outside the planetary unit; clutch drum bolted to outer face of planetary housing.

BOOMHOIST LIMITING DEVICE — Cab-mounted device which, when it comes in contact with the boom, causes simultaneous engagement of the automatic spring-applied boomhoist brake and disengagement of the boomhoist clutch.

INDEPENDENT SWING SHAFT (Horizontal) — Mounted in line bore on anti-friction bearings.

Spur Gears — Machine-cut teeth; mounted on shaft on anti-friction bearings.

Bevel Gear — Involute splined to shaft; fully enclosed and running in oil.

Swing Brake — Two-directional, external contracting band; spring applied, power hydraulically released. Brake drum involute splined to vertical swing shaft on 48A, 78A and 108B; splined to horizontal swing shaft on 138, 218 and 238.

VERTICAL SWING SHAFT — Mounted in line bore on anti-friction bearings.

Bevel Gear — Machine-cut or shell-molded teeth, involute splined to shaft; fully enclosed and running in oil.

Swing Pinion — Involute splined to shaft; teeth mesh with teeth of ring (swing) gear which is integral with hook roller path or turntable bearing, depending on specific model.

SWING BRAKE — External contracting band type; spring applied, hydraulically released. Mechanically controlled from operator's position.

SWING LOCK — Mechanically controlled pawl engages with teeth of ring (swing) gear.

SWING SPEED — R.P.M. based on std. diesel engine running at full load r.p.m.

48A	78A	108B	138	218	238
4.8	4.2	4.0	3.36	2.98	2.8

BAIL — Supports boom suspension system; sheaves mounted on anti-friction bearings.

	48A	78A	108B	138	218	238
No. sheaves	5	5	5	7	7	8
Bail mounting	①	②	②	①	①	①

① Pinned to upper frame.

② Pinned to retractable high gantry.

CAB — Operator doors may be hinged or roll on ball bearing rollers depending on specific model. Operator cab door and windows equipped with safety glass panels. Standard equipment includes electric horn warning device, dry chemical fire extinguisher, hand grab rails, roof-top access ladder, and skid-resistant finish on roof. Optional equipment includes cab heater and fan-type defroster.

CATWALKS — Optional for all models; catwalks with railings on both sides and rear of cab.

COUNTERWEIGHT —

	48A	78A	108B	138	218	238
Weight	9,200#	13,200#	19,200#	18,000#	21,000#	47,300#
No. pieces	One	One	One	One	One	Two

ENGINES — Standard (Diesel)

Specifications	48A	78A	108B	138	218	238
Manufacturer Model	GM 3-53N	GM 3-71N	GM 4-71N	GM 4-71N	GM 6-71N①	GM 6-71N①
Number of cylinders Bore and stroke (inches) Piston displacement (cu. in.)	3 3⅞ x 4½ 159.2	3 4¼ x 5 212.7	4 4¼ x 5 283.7	4 4¼ x 5 283.7	6 4¼ x 5 425.6	6 4¼ x 5 425.6
High idle speed (r.p.m.) Engine full load speed (r.p.m.)	2,100 1,935	1,990 1,815	1,990 1,850	1,990 1,850	1,940 1,800	2,040 1,900
Net engine h.p. @ f.l.s. Peak torque (lbs. ft.) Peak torque r.p.m.	60 164 1,000	84 271 1,200	112 351 1,200	110 351 1,200	165 1,400 Converter stall	171 1,400 Converter stall
Electrical system Batteries	12-volt 2/6-volt	12-volt 2/6-volt	12-volt 2/6-volt	12-volt 2/6-volt	12-volt 1/12-volt	12-volt 1/12-volt
Clutch — Type — Make — Model	Friction Twin Disc C108-HP-1	Friction Twin Disc② SP1U-HP-1	Friction Twin Disc SP111-HP-1	Friction Twin Disc SP111-HP-1	Disconnect between engine & torque converter	Disconnect between engine & torque converter
TRANSMISSION — No. chain wheel teeth No. engine pinion teeth	 123 16	 161 17	 161 17	 161 18	 161 28	 171 21

① *Allison single stage torque converter #TCDO-475.*

② Or optional Cotta TSU transmission.

CONTROL SYSTEM — *Speed-o-Matic hydraulics:* an open system. Operating pressure is transmitted through oil to all operating 2-shoe clutch cylinders, swing brake, and boomhoist drum brake cylinders. The system includes a pump to provide a constant flow of oil, an accumulator to maintain operating pressure and variable pressure, operator-controlled valves to regulate this pressure to each clutch cylinder.

Pump — Model 48A; Lear Siegler, 4 g.p.m. @ 2,000 r.p.m. All other models; Vickers, rated at 4.7 g.p.m. @ 1,200 r.p.m.

Oil Filter — FMC; replaceable Skinner ribbon-type filter element.

Relief Valve — FMC; set to operate at 1,250 p.s.i.

Unloader Valve — FMC; set to unload pump at a maximum 1,050 p.s.i. and to load pump when pressure drops below 900 p.s.i.

Accumulator — FMC; piston-type, pre-charged with nitrogen gas to 650 p.s.i.

Sump Tank — FMC; model 48A — 5½ gallons capacity; all other models 7 gallons; filter and strainer assembly to keep oil clean.

Control Valves — FMC; variable pressure type.

AUXILIARY CONTROLS — (In operator's cab)

Swing Brake — Standard on all models.

Foot Throttle — Standard on all models.

Hand Throttle — Standard on all models.

Optional Hand Throttle — Mounted on swing control lever. Available on all models.

CRANE BOOMS, TIP EXTENSIONS & AUXILIARY EQUIPMENT

BOOMS — Angle booms with open throat top section

ANGLE BOOM	48A	78A	ABS-108B	API-108B	138	218	238
Basic length	25'	35'	40'	40'	50'	50'	50'
Top Section	11' 6"	15'	20'	20'	25'	25'	25'
Base Section	13' 6"	20'	20'	20'	25'	25'	25'
Main chord angles (inches)	2 1/2 x 2 1/2 x 1/4	①	①	4 x 4 x 5/16"	4 x 4 x 3/8	4 x 4 x 3/8	4 x 4 x 3/8
Dimensions at connections	26" x 29 1/2"	34" x 34"	34" x 34"	42" x 42"	48" x 48"	48" x 48"	48" x 48"
Boomfoot width/centers	1 1/2"/29"	1 5/8"/35"	1 5/8"/38"	1 3/4"/38"	2 3/8"/54"	2 1/2"/60"	2 1/2"/60"
Boomfoot pin diameter	2 1/2"	2 3/4"	3"	3"	3 1/4"	3 1/2"	4"
Type connections	Bolted	Bolted	Bolted	Pinned	Bolted	Bolted	Bolted
Extensions available	5', 10', 20'	5', 10', 15', 20'	5', 10', 20'	10', 20', 30'	10', 20', 30'	10', 20', 30'	10', 20', 30'
Size/Type pendants	7/8" Type "N"	1 1/8" Type "N"	1 1/2" Type "N"	1 1/4" Type "N"	1 1/2" Type "N"	1 3/4" Type "N"	1 3/4" Type "N"
No. boompoint sheaves	3	3②	3	3	5	5	5

① 3" x 3" x 3/8" base section; 3" x 3" x 5/16" top section.

② Four sheaves required for booms 60' long and under to handle maximum ABS rated load.

BOOM STOPS — Dual with spring-loaded bumper ends.

Models 48A and 78A — Fixed, rigid type mounted on top of cab.

Models 108B, 138, 218 and 238 — Lever type, mounted on low mast shaft at cab top and supported by lever arms attached to boom base section.

BOOMHOIST BRIDLE SPREADER BAR — Standard equipment (and available only) on models 138, 218, and 238. Furnished in conjunction with bridle as connection between bridle and boom pendants.

BOOM LIVE MAST — *Supports boomhoist bridle; standard* on 48A, 138, 218, and 238; not required or available on 78A or 108B.

BOOM TIP EXTENSIONS — Angle type, mounted in fixed position 15° offset from centerline of boom. Optional for all models — *provides additional clearance between main load hoist hook block and auxiliary single-part wire rope* hoist line. (Specific clearance varies between models, boom lengths, and boom radii.)

Model 48A — 8' long; 5,000# maximum capacity.

Models 78A, 108B, 138, 218, and 238 — 10' long; 10,000# maximum capacity.

BOOMHOIST BRIDLE — Serves as connection between boom pendants and boomhoist wire rope reeving to bail.

	48A	78A	108B	138	218	238
No. bridle sheaves	5	5	5	7	7	3

BOOM ANGLE INDICATOR — Mounted on boom near base.

LOAD HOIST ROPE DEFLECTOR ROLLERS — To deflect main load hoist wire rope over top side of boom. Required when third drum rope passes over crane boom tip. Rollers mounted on anti-friction bearings. Model 48A — optional for basic boom and boom extensions. Models 78A and 108B — *one roller standard on basic boom and rollers op*tional for boom extensions. Models 138, 218, and 238 — one roller standard on basic boom and one roller standard with each boom extension.

TAGLINE WINDER — Spring-wound drum type; mounted on crane boom.

WIRE ROPE — Type and Size (Diameter) Used

Boomhoist: Type "N" (48A, 78A, 108B) — Type "T" (138, 218, 238)

	48A	78A	108B	138	218	238
Parts of line	10	10	10	14	14	16
Size	1/2"	5/8"	5/8"	3/4"	3/4"	7/8"

Main Load Hoist: Type "N" (48A, 78A, 108B, 138, 238) — Type "F" (218)

Size	1/2"	5/8" or 3/4"①	3/4"	3/4"	7/8"	1"

① Used only for auxiliary hoist rope with required lagging change for use with 10" boom tip extension.

Boom Pendants: Type "N" (48A, 78A, 108B, 138, 238) — Type "F" (218)

Size	7/8"	1 1/8"	1 1/2" ABS 1 1/4" API	1 1/2"	1 3/4"	1 3/4"

Type "F" — 6 x 25 (6 x 19 class), filler wire, improved plow steel, preformed, independent wire rope center, right lay, regular lay.

Type "N" — 6 x 25 (6 x 19 class), filler wire, extra improved plow steel, preformed, independent wire rope center, right lay, regular lay.

Type "T" — 6 x 25 flattened strand, extra improved plow steel, independent wire rope center. (**Note:** Wire ropes furnished for ABS machines are the same as furnished for API machines except boom pendants for 108B.)

MAIN LOAD HOIST WIRE ROPE — Type and Length (Feet)

MODEL 48A — Type "N", 1/2" dia.

Parts of Line	BOOM LENGTH							
	25′	30′	35′	40′	50′	60′	70′	80′
1	60	70	80	90	110	130	150	170
2	90	110	125	140	170	200	230	260
3	120	140	160	180	220	260	300	340
4	160	180	205	230	280	330	380	430
5	190	220	250	280	340	400	460	
6	220	260	295	330	400	470		

MODEL 78A — Type "N", 5/8" or 3/4"* dia.

Parts of Line	BOOM LENGTH							
	35′	40′	50′	60′	70′	80′	90′	100′
1	85	95	115	135	155	175	195	215
2	125	140	170	200	230	260	290	320
3	165	185	225	265	305	345	385	425
4	205	230	280	330	380	430	480	530
5	245	275	335	395	455	515	575	635
6	285	320	390	460	530	600	670	740
7	325	365	445	525	605	685		
8	365	410	500	590	680			

*Used only for auxiliary hoist rope with required lagging change for use with 10′ boom tip extension.

MODEL 108B — Type "N", 3/4" dia.

Parts of Line	BOOM LENGTH						
	40′	50′	60′	70′	80′	90′	100′
1	95	115	135	155	175	195	215
2	140	170	200	230	260	290	320
3	185	225	265	305	345	385	425
4	230	280	330	380	430	480	530
5	275	335	395	455	515	575	635
6	320	390	460	530	600	670	740
7	365	445	525	605	685	765	845
8	410	500	590	680	770	860	950
9	455	555	655	755			
10	500	610	720				

MODEL 138 — Type "N", 3/4" dia.

Parts of Line	BOOM LENGTH										
	50′	60′	70′	80′	90′	100′	110′	120′	130′	140′	150′
1	145	165	185	205	225	245	265	285	305	325	345
2	200	230	260	290	320	350	380	410	440	470	500
3	255	295	335	375	415	455	495	535	575	615	655
4	310	360	410	460	510	560	610	660	710	760	810
5	365	425	485	545	605	665	725	785	845	905	965
6	420	490	560	630	700	770	840	910	980		
7	475	555	635	715	795	875	955				
8	530	620	710	800	890	980					
9	585	685	785	885	985						
10	640	750	860	970							

MODEL 218 — Type "F", 7/8" dia.

Parts of Line	BOOM LENGTH										
	50′	60′	70′	80′	90′	100′	110′	120′	130′	140′	150′
1	145	165	185	205	225	245	265	285	305	325	345
2	200	230	260	290	320	350	380	410	440	470	500
3	255	395	335	375	415	455	495	535	575	615	655
4	310	360	410	460	510	560	610	660	710	760	810
5	365	425	485	545	605	665	725	785	845	905	965
6	420	490	560	630	700	770	840	910	980		
7	475	555	635	715	795	875	955				
8	530	620	710	800	890	980					
9	585	685	785	885	985						
10	640	750	860	970							

MODEL 238 — Type "N", 1" dia.

Parts of Line	BOOM LENGTH										
	50′	60′	70′	80′	90′	100′	110′	120′	130′	140′	150′
1	120	140	160	180	200	220	240	260	280	300	320
2	180	210	240	270	300	330	360	390	420	450	480
3	240	280	320	360	400	440	480	520	560	600	640
4	300	350	400	450	500	550	600	650	700	750	800
5	360	420	480	540	600	660	720	780	840	900	960
6	420	490	560	630	700	770	840	910	980		
7	480	560	640	720	800	880	960				
8	540	630	720	810	900	990					
9	600	700	800	900							
10	660	770	880	990							

We are constantly improving our products and therefore reserve the right to change designs and specifications.

FMC
FMC Corporation
Crane and Excavator Division
Cedar Rapids Iowa 52406
Plants in: Ontario, Canada • Milan, Italy • Queretaro, Mexico

Tidewater Marine

February 27, 1978

Mr. Jim Shaff
Global Marine Development, Inc.
P. O. Box 3010
Newport Beach, CA 92663

Dear Jim:

I very much appreciated the opportunity to talk to you last week concerning your design study for a project with the U.S. Navy. Keeping with our conversation, I am forwarding to you, enclosed, a brochure covering our 218' - 10,000 horsepower vessel and also our 194' - 5,700 horsepower class vessel.

If this project is a year away, we would hope to be able to furnish either of these sizes of vessels on the West Coast or the Gulf Coast. The larger vessels, at the present time, would have a rate in a range of $5,500 to $6,000 per day depending on the job; and the 194' class would have a cost of $3,500 to $4,000 per day. These prices would, undoubtedly, escalate some if the project is a year or more in the future. These prices, of course, do not include fuel, lubricants, cordage, etc., as these items would be for the customer's account.

I do feel this data is good for estimated purposes, and we would hope that you would keep in touch with us as the program progresses. We would be happy to furnish additional information on request.

Yours very truly,

TIDEWATER MARINE SERVICE, INC.

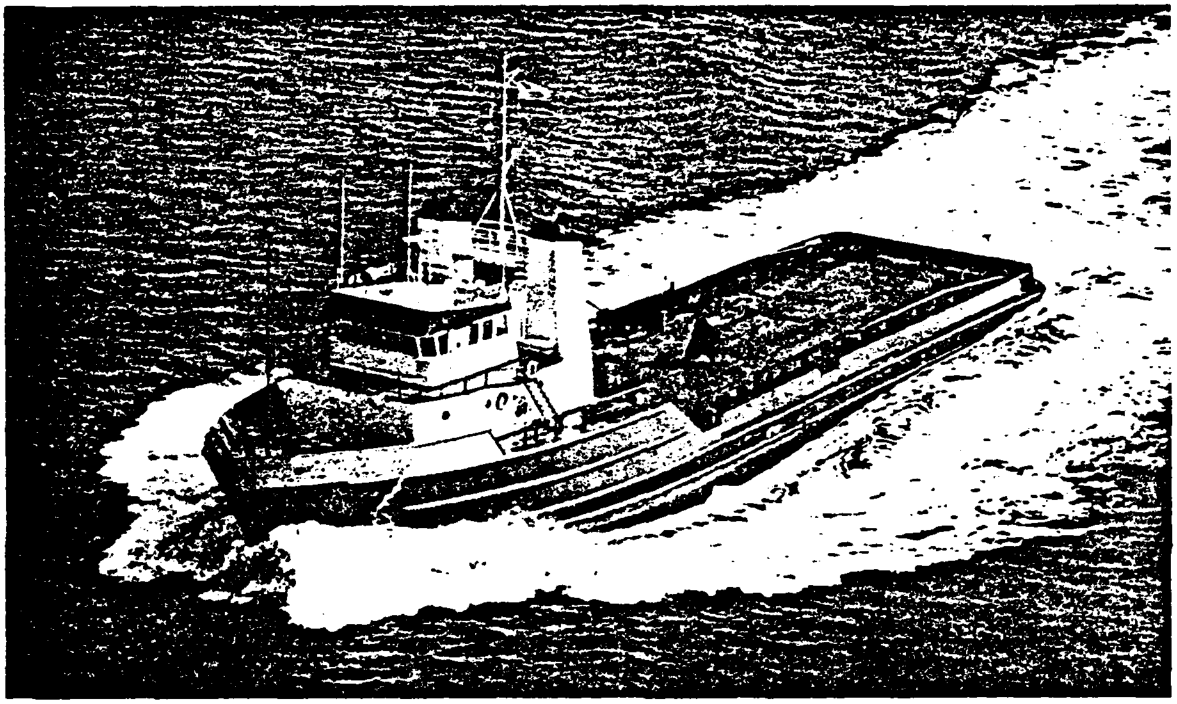
Howard Hogue

A. Howard Hogue
Executive Vice President

AHH:ms
cc: Sam Allgood

TIDEWATER MARINE SERVICE, INC.
104 East Haley Street
Santa Barbara California 93101
Telephone 805-963-1774
Telex U S A 65-8412
A Tidewater Company

194' Class Towing Supply Vessel



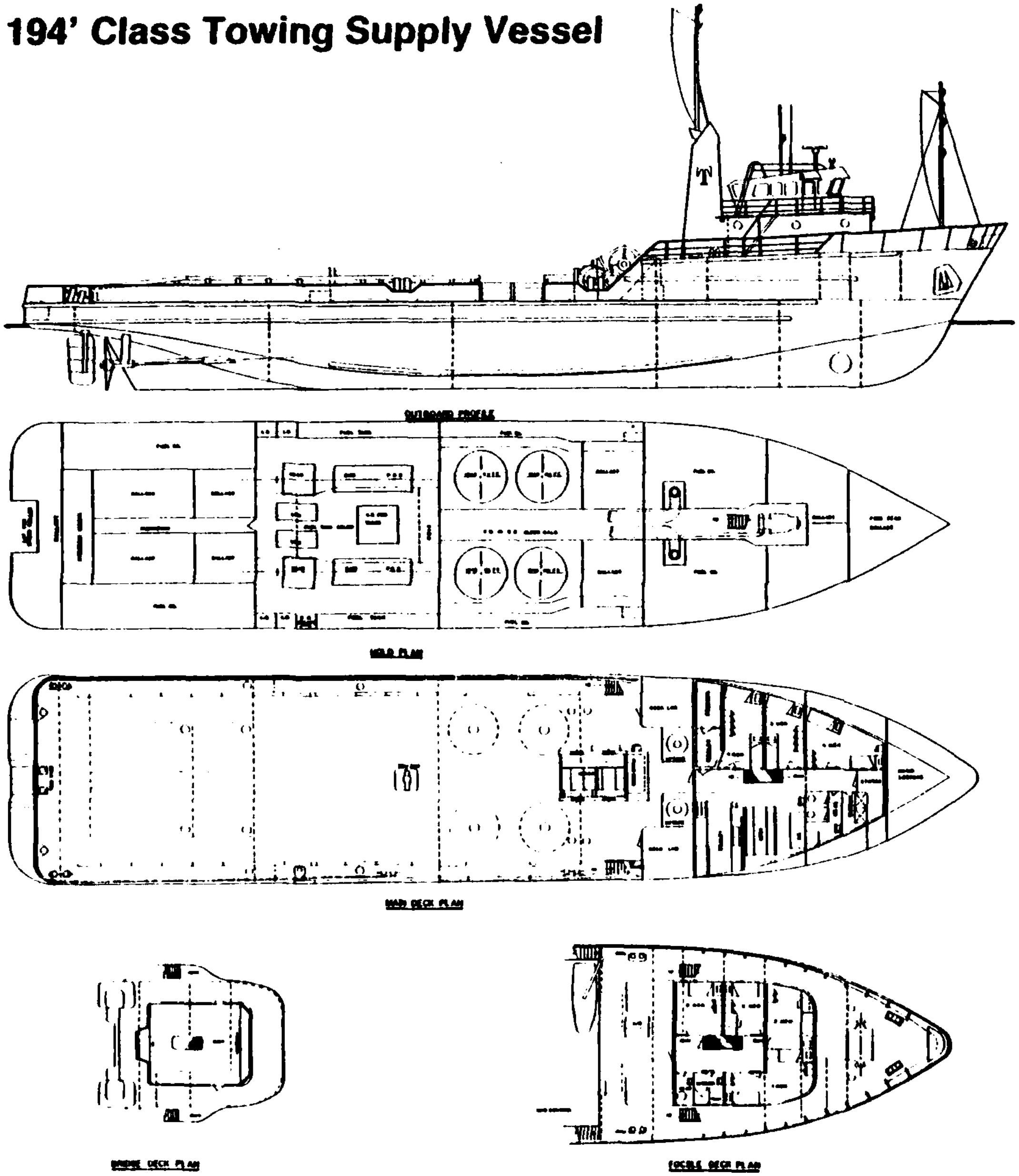
GENERAL DESCRIPTION

Tidewater's 194' Class Towing Supply Vessel is designed for supplying, towing, and anchor handling applications with large floating drilling equipment in deep water in the toughest of weather. Powered by two EMD 16-645-E7 engines providing 5750 continuous horsepower, the vessels are capable of achieving a speed of 15 knots and providing an estimated 70 tons of bollard. Supply capacities are designed for the optimum with deck cargo capacity of 550 tons and P-tank capacity of 4160 cubic feet.

With a SMATCO 72-DAW-250 double drum towing winch providing 300,000 pounds of single line pull, the vessel class is capable of handling today's big anchors in the deep water locations. The class is finished with the most modern optional equipment including the latest in electronic and fire fighting gear and can comfortably accommodate 21 persons in fully air-conditioned and heated quarters.

TIDEWATER MARINE SERVICE, INC.

194' Class Towing Supply Vessel



Specifications

Length, O.A. Molded	194 ft. 0 in.	59.13 m
Breadth, Molded	40 ft. 0 in.	12.19 m
Depth, Molded	17 ft. 0 in.	5.18 m
Design Draft, Molded	14 ft. 6 in.	4.42 m
After Deck Clear, width	32 ft. 0 in.	9.75 m
After Deck Clear, (excl. winch area), length	108 ft. 0 in.	32.92 m

Capacities

Diesel Fuel	167,000 gal	537 M tons
Potable Water	6,200 gal	23 M tons
Drill Water	190,000 gal	720 M tons
Deck Cargo (est.)	550 tons	541 M tons
Bulk Storage (4 - 1,040 cu. ft. P-tanks)	4,160 cu ft	117.8 cu m
Refrigerated Stores	300 cu ft	8.5 cu m
Frozen Stores	300 cu ft	8.5 cu m
Accommodations	21 persons, 7 staterooms, galley, mess, air-conditioning and coil heating throughout quarters.	

Propulsion

Type & Model	Two (2) GM EMD Model 16-645-E7
Indicated BHP (est.)	7,010 @ 900 RPM
Intermittent BHP	6,325 @ 900 RPM
Continuous BHP	5,750 @ 900 RPM
Gears	Lufkin Model RHS-2S-3622 (Ratios 5.17:1 & 4.17:1)
Speed	15 knots
Bollard Pull Static (est.)	140,000 lbs. 70 tons
Bow Thruster	300 HP

Propulsion (Option)

Type & Model	Two (2) GM EMD Model 12-645-E7
Indicated BHP (est.)	5245 @ 900 RPM
Intermittent BHP	4730 @ 900 RPM
Continuous BHP	4300 @ 900 RPM
Gears	Lufkin Model RHS-2S-3024 (Ratios 5.17:1 & 4.17:1)
Speed	14 knots
Bollard Pull Static (est.)	110,000 lbs. 55 tons
Bow Thruster	300 HP

Generators

Type	Two (2) Delco 150 KW 440 VAC 60 cps
Total KW	300

Transfer Rates

Liquid Transfer: Discharge on main deck with the following rated pump discharge capacities:
Diesel Fuel: 550 gpm @ 120 ft. TDH
Drill Water: 400 gpm @ 120 ft. TDH
Bulk Transfer: Gardner Denver Model HIQ bulk material discharge air compressor rated at 427 CFM @ 40 psi.

Classification

Constructed in accordance with the American Bureau of Shipping Rules for Unrestricted Ocean Service and Classed + A1, +AMS towing service with notation that the after deck is strengthened for anchor handling and the carriage of cargo.

Electronics

Radar	Autopilot (optional)
VHF/FM Radio	Fathometer
SSB Radio	Emergency SSB

Deck Machinery

Anchors & Windlass: HBL Model SDW1.25H electro-hydraulic anchor windlass with two (2) gypsies & two (2) wildcats, with two (2) lengths 1¼ inch H.S. chain. Two (2) 2500 lb. Danforth anchors.

Towing/Anchor Handling Winch: SMATCO Model 72-DAW-250 double drum, waterfall type, 300,000 lb. single line pull. Tow wire capacity 3680 ft. of 2 inch cable.

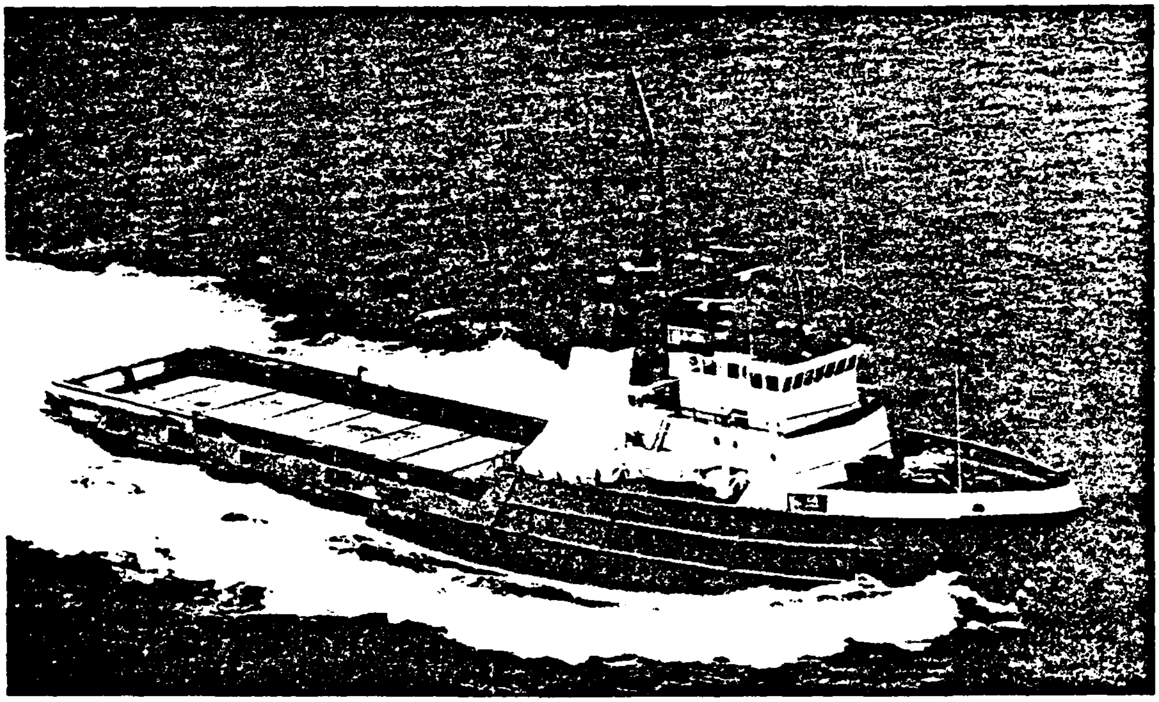
Stern Roller: 60 inch/54 inch x 8 ft.

Fire Fighting

Five (5) 1½-inch fire stations with hose and nozzles. Portable extinguishers throughout vessel.

The above specifications are intended to generally describe this vessel class. Individual vessel specifications and equipment options are available upon request.

218' Class Towing Supply Vessel



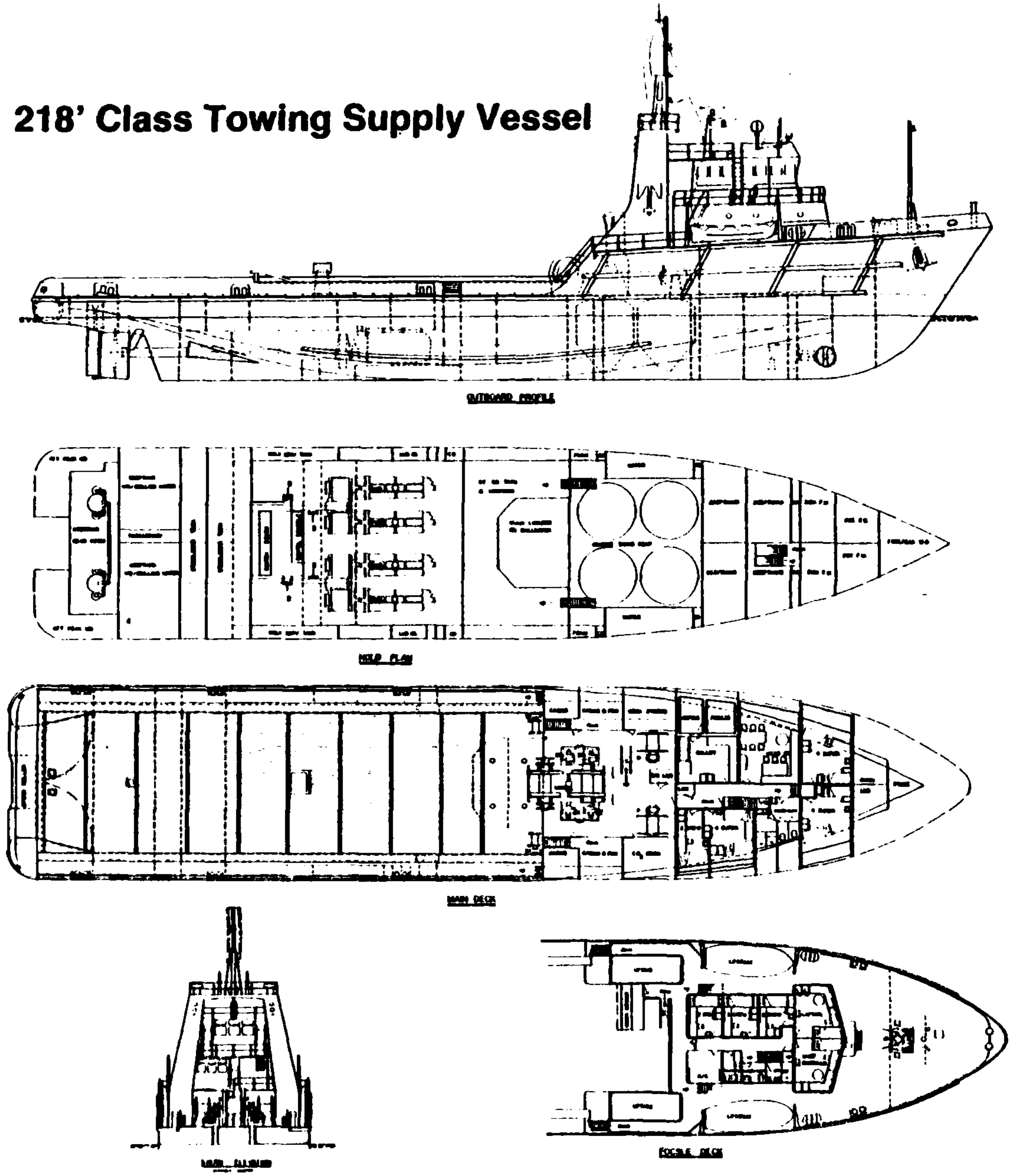
GENERAL DESCRIPTION

Tidewater's 218' Class Towing Supply Vessel is the most versatile of the large, powerful vessels serving the offshore oil industry. Especially designed for adverse weather conditions such as experienced in the North Sea, the twin screw vessel is powered by four (4) General Motors EMD Model 16-645E2 main engines which provide 227,000 pounds bollard pull—ample power for towing the largest drilling rigs. When a 16½ knot free running speed is not required, or for "standing by" at the rig, considerable fuel savings may be realized by using only two (2) of the main propulsion engines.

An advanced propulsion system comprised of Liaaen Controllable Pitch Propellers in BCP "Towmaster" nozzles is enhanced by the reliability of pneumatic controls. "Shutter" rudders, three (3) aft of each propeller, provide excellent maneuverability and turning power for efficient towing and anchor handling.

TIDEWATER MARINE SERVICE, INC.

218' Class Towing Supply Vessel



Specifications

Length O.A. Molded	218 ft 0 in	66.40 m
Breadth Molded	43 ft 0 in	13.10 m
Depth Molded	19 ft 0 in	5.80 m
Design Draft Molded	14 ft 6 in	4.43 m
After Deck Clear, width	32 ft 0 in	9.75 m
After Deck Clear (excl. winch area), length	116 ft 0 in	35.36 m

Capacities

Diesel Fuel	220,710 gal	705 M tons
Potable Water	43,680 gal	165 M tons
Drill Water	197,120 gal	764 M tons
Deck Cargo (est.)	550 tons	541 M tons
Bulk Storage (4 - 1500 cu. ft. P-tanks)	6,000 cu ft	170 cu m
Refrigerated Stores	525 cu ft	15 cu m
Frozen Stores	525 cu ft	15 cu m
Accommodations	20 persons, 7 staterooms, galley, mess, hospital, air-conditioning and coil heating throughout quarters	

Propulsion

Type & Model	Four (4) GM EMD 16-645E2
Total Indicated BHP	10,340 @ 900 RPM
Total Intermittent BHP	8,680 @ 900 RPM
Total Continuous BHP	7,800 @ 900 RPM
Gears	Lufkin Model CSO9610 5:1 reduction gears and Liaaen controllable pitch propellers in BCP "Towmaster" nozzles
Speed	16 knots
Bollard Pull, Static	227,000 lbs 103 tons
Bow Thruster	525 HP

Generators

Type	Two (2) Delco 250 KW One (1) Delco 75 KW
Total KW	575 KW (Parallel)

Transfer Rates

Liquid Transfer: Discharge on main deck with the following rated pump discharge capacities:
Diesel Fuel: 700 gpm @ 200' TDH
Drill Water: 700 gpm @ 200' TDH

Bulk Transfer: Two (2) Gardner-Denver WAQ bulk material discharge air compressors rated at 427 CFM @ 40 psi. (Total 854 CFM)

Classification

Constructed in accordance with the American Bureau of Shipping Rules for Unrestricted Ocean Service and classed +A1, +AMS E Towing Service with notation that the hull is strengthened to Ice Class "C" and the deck is strengthened for the carriage of deck cargo and anchor handling

Electronics

Two (2) Radars	SSB Radio
Autopilot	Fathometer
VHF/FM Radio	Emer. SSB Radio

Deck Machinery

Anchors & Windlass: SMATCO Model 1250 EHAD-40 Hydraulic anchor windlass rated 45 ft/min. with two (2) gypsies and two (2) wildcats, with two (2) lengths 1-5/16 inch HS chain and two (2) 2360-lb. Danforth anchors.

Towing/Anchor Handling Winch: SMATCO Model 72 DAW 250 double drum waterfall type with line pull of 300,000 lb. Tow wire capacity 3000 ft. of 2-inch cable.
Stern Roller: 78 inch/72 inch X 12 ft.
Gantry: 60 ton travelling gantry (optional)

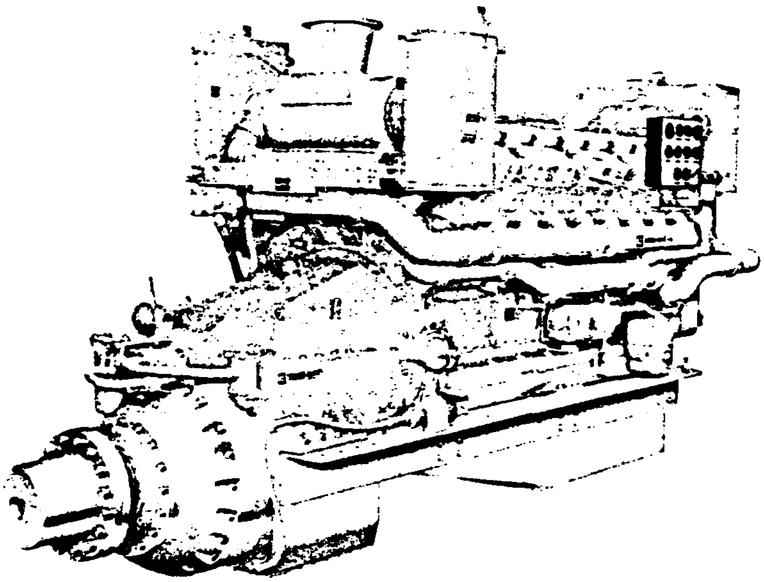
Fire Fighting

Four (4) 1½-inch fire stations with hose and nozzles. Portable extinguishers throughout vessel. Two (2) diesel driven fire pumps of 1080 gpm @ 300 psi with two (2) foam compound proportioning units discharging thru two (2) dual purpose water/foam monitors.

The above specifications are intended to generally describe this vessel class. Individual vessel specifications and equipment options are available upon request

CATERPILLAR D399

MARINE PROPULSION ENGINE



SHOWN WITH ACCESSORY EQUIPMENT

MARINE GEAR	GEAR RATIOS
Caterpillar 7251	1:1
Caterpillar 7261	2.89:1
	3.18:1
	3.49:1
	3.84:1
	4.22:1

V-16 **TURBOCHARGED AFTERCOOLED**
4 STROKE CYCLE **PRECOMBUSTION CHAMBER**

Bore	6.25 in	159 mm
Stroke	8.00 in	203 mm
Displacement	3927 cu in	64.4 litres
Engine Dry Weight (JWAC-H/E)	18085 lb	8203 kg
Marine Gear Dry Weight (Cat 7261)	7266 lb	3296 kg
Total Weight	25351 lb	11499 kg

STANDARD EQUIPMENT

Cooling System:
Expansion Tank
Seawater or Freshwater Pump
Jacket Water Pump
Fuel System:
Priming Pump
Transfer Pump
Fuel Ratio Control
Fuel Filter
Lubrication System:
Oil Filter
Oil Cooler
Manual Sump Pump
Emergency Lube Oil Connections
Automatic Prelubricator (110-220 V)
Air & Exhaust System:
Dry Air Cleaners
Air Cleaner Service Indicator
Air Cleaner Inlet Adapter
Watercooled Exhaust Manifold
Watercooled Turbocharger Shield
Control System:
Hydra-Mechanical Governor
Manual Shutoff Control
Safety System:
Oil Pressure and Water Temperature Contactors
Intake Manifold Temperature Contactors (seawater & separate circuited engines only)
Overspeed & Engine Reversal Protection
Gauges & Instrument Panel:
Fuel Pressure
Inlet Manifold Air Temperature (2)
Lubricating Oil Pressure & Temperature
Marine Gear Oil Pressure & Temperature
Exhaust (Stack) Temperature
Engine RPM
Water Temperature
Miscellaneous:
Front Accessory Drive
Dual Tachometer Drive
Mounting Rails—Ledge Type
Service Hour Meter
Vibration Damper

ACCESSORY EQUIPMENT

Marine Gear:
Cat 7251
Cat 7261
Cooling System:
Heat Exchangers
Emergency Jacket Water Connections
Fuel System:
Flexible Fuel Lines
Duplex Fuel Filter
Air & Exhaust System:
Flexible Exhaust Fitting
Muffler
Starting System:
Air Starting
Electric Starting (24, 30, 32 V) (Two Wire Insulated System)
Alternator (24, 30, 32 V)
Glow Plugs (24, 30, 32 V)
Control System:
Sequenced Engine, Gear & Shaftbrake Controls
Safety System:
Electric Shutoffs
Mechanical Shutoffs
Crankcase Explosion Relief Valve
Power Takeoff:
Front Enclosed Clutch
Auxiliary Drives
Front End Stub Shaft
Pulley

D399 MARINE PROPULSION ENGINE

RATINGS

*Separate Circuit Aftercooling, with 110°F (44°C) maximum water temperature to the aftercooler.

	rpm	hp	kW
CONTINUOUS RATING	1225	1090	813
Shaft Power	1225	1057	789

	rpm	U.S. gph	litre/h
Fuel Rate	1225	60.8	230.3
	1100	44.4	168.0
	1000	33.1	125.3
	900	24.9	94.2

Separate Circuit Aftercooling, with 85°F (30°C) maximum water temperature to the aftercooler.

	rpm	hp	kW
CONTINUOUS RATING	1225	1125	839
Shaft Power	1225	1091	813

	rpm	U.S. gph	litre/h
Fuel Rate	1225	61.6	233.2
	1100	44.9	170.2
	1000	33.5	126.9
	900	25.2	95.6

Jacket Water Aftercooling

	rpm	hp	kW
CONTINUOUS RATING	1225	1000	746
Shaft Power	1225	970	724

	rpm	U.S. gph	litre/h
Fuel Rate	1225	56.6	214.2
	1100	41.3	156.3
	1000	31.0	117.4
	900	23.3	88.1

RATING DEFINITION

CONTINUOUS is the power and speed capability of the engine which can be used without interruption or load cycling.

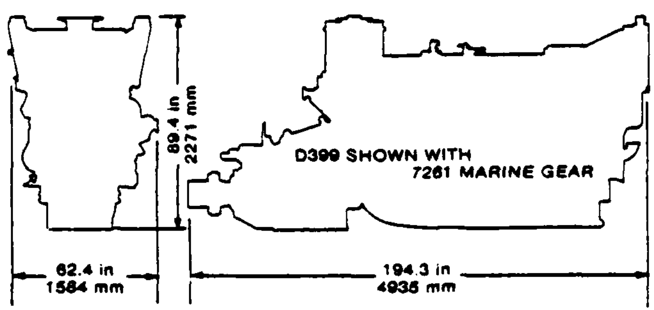
RATING CONDITIONS

***Seawater temperatures cannot exceed approximately 70°F (21°C) to accommodate a maximum temperature of 85°F (29°C) in the aftercooler closed cooling system.**

Shaft power represents power requirements of a typical fixed pitch propeller and represents 97 per cent of gross engine horsepower.

Ratings are based on SAE J816 standard conditions of 29.38 in Hg (99.2 kPa) and 85°F (30°C). These ratings also apply at DIN 6270 standard conditions of 97.8 kPa (28.97 in Hg) and 20°C (68°F).

Fuel consumption is based on fuel oil having an HHV of 19590 Btu/lb (45570 kJ/kg) and weighing 7.076 lb/U.S. gal (848 g/litre).



Materials and specifications are subject to change without notice.

The International System of Units (SI) is used in this publication

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Supersedes LEO21229-03

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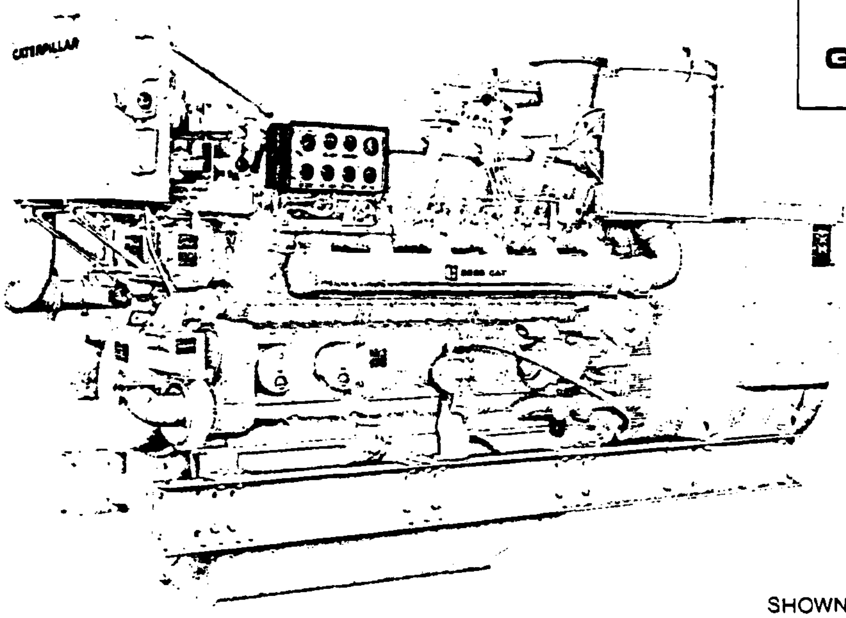
CATERPILLAR D398

MARINE GENERATOR SET



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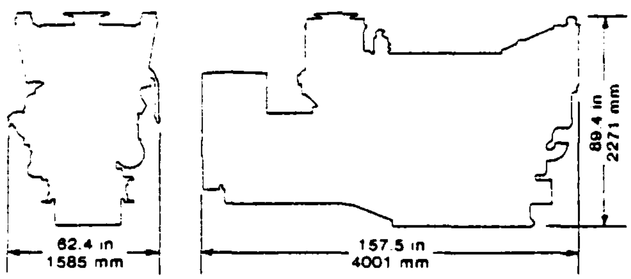

V-12	TURBOCHARGED AFTERCOOLED	
4 STROKE	PRECOMBUSTION CHAMBER	
Bore	6.25 in	159 mm
Stroke	8.00 in	203 mm
Displacement	2945 cu in	48.3 litre
Engine Dry Weight (JWAC-H/E)	13460 lb	6105 kg
SRCR Generator Weight	5455 lb	2474 kg
Total Weight	18915 lb	8580 kg

STANDARD EQUIPMENT

Cooling System:
Expansion Tank
Seawater or Freshwater Pump
Jacket Water Pump

Fuel System:
Priming Pump
Transfer Pump
Fuel Filter
Flexible Fuel Lines

Lubrication System:
Oil Filter
Oil Cooler
Manual Sump Pump
Emergency Lube Oil Connection

Air & Exhaust System:
Dry Type Air Cleaners
Air Cleaner Service Indicator
Air Cleaner Inlet Adapter
Water Shielded Exhaust Manifold
Watercooled Turbocharger Shield

Control System:
UG8 Woodward Governor Group
Manual Shutoff Control

Safety System:
Oil Pressure and Water Temperature Contactors
Intake Manifold Temperature Contactors (Seawater and Seperate Circuited Engines Only)
Shutoff Group, Oil Pressure and Overspeed

Gauges & Instrument Panel:
Fuel Pressure
Inlet Manifold Air Temperature (2)
Lubricating Oil Pressure & Temperature
Exhaust (Stack) Temperature
Engine RPM
Jacket Water Temperature

Miscellaneous:
Front Accessory Drive
Dual Tachometer Drive
Mounting Rails—Floor Type
Service Hour Meter
Vibration Damper

ACCESSORY EQUIPMENT

Generator—SRCR:
60 Hz, 1200 RPM
550 kW Prime
230-460 Volt
3 Phase, 10 Wire, Wye Connection

Cooling System:
Heat Exchangers
Emergency Jacket Water Connections

Fuel System:
Duplex Fuel Filter

Air & Exhaust System:
Flexible Exhaust Fitting
Muffler

Starting System:
Air Starting
Hydraulic Starting
Electric Starting (24, 30, 32V) (2-wire Insulated System)
Alternator (24, 30, 32V)
Glow Plugs (24, 30, 32V)

Safety System:
Electric Shutoffs
Mechanical Shutoffs
Crankcase Explosion Relief Valves

Power Takeoff:
Front Enclosed Clutch
Auxiliary Drives
Front End Stub Shaft
Pulleys

Generator Set Society Certification:
American Bureau of Shipping
Det norske Veritas
Lloyd's Register of Shipping

D398 MARINE GENERATOR SET

RATINGS

Jacket Water Aftercooled—WS*

	rpm	kW	kVA
PRIME POWER—60 HZ	1200	550	688

	percent load	U.S. gph	litre/h
Fuel Rate	100	43.0	162.7
	75	32.6	123.6
	50	22.3	84.5
	25	13.1	49.5

*WS—Watershielded Manifold

RATING DEFINITION

PRIME POWER—For continuous electrical service.

RATING CONDITIONS

Ratings are based on SAE J816 standard conditions of 29.38 in Hg (99.2 kPa) and 85°F (30°C). These ratings also apply at DIN 6270 standard conditions of 97.8 kPa (28.97 in Hg) and 20°C (68°F).

Fuel consumption is based on fuel oil having an HHV of 19590 Btu/lb (45570 kJ/kg) and weighing 7.076 lb/U.S. gal (848 g/litre).

SRCR GENERATOR

Construction:
Revolving-field, single bearing AC generator with built-in, statically-regulated, statically-excited system. Built to IEEE-45 standards.

Excitation:
By rectified alternating current. Voltage buildup relay only moving part.

Regulation:
Volts per Hertz regulation. Silicon controlled rectifier. Transistorized voltage regulator with no moving parts, automatically maintains voltage within ±1% from no load to full load. No external voltage regulator needed. Shock mounted and epoxy encapsulated for protection against vibration and unfavorable atmospheric conditions.

Insulation:
High temperature Class F insulation in stator and rotor. Treated against abrasion and fungus deterioration with epoxy impregnation and an additional overcoat of asphaltic material.

Parallel Operation:
Equipped with reactive droop compensation.

Coupling:
Close-coupled, multiple steel disc type. Piloted shaft insures proper alignment and minimizes linear vibration.

Voltage Level:
Adjustable from rated voltage a minimum of ±5%.

Voltage droop:
Adjustable for proper division of reactive kVA when operating in parallel with other generators.

Voltage Gain:
Adjustable to compensate for engine speed variation when operating with a speed droop governor.

Marine Requirements:
Embedded temperature detectors and generator space heaters where required by Marine Societies.

Materials and specifications are subject to change without notice.

The International System of Units (SI) is used in this publication.

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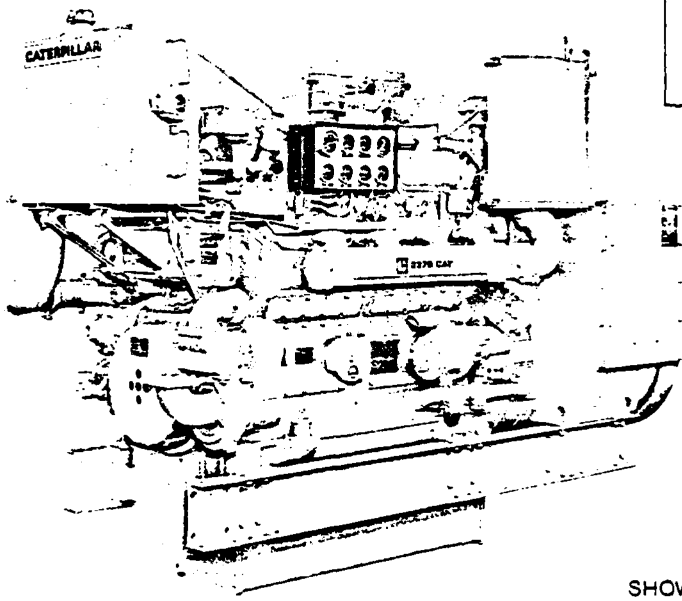
CATERPILLAR D379

MARINE GENERATOR SET



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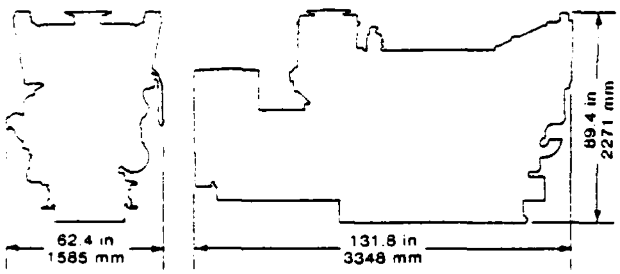

V-8 | **TURBOCHARGED AFTERCOOLED**
4 STROKE CYCLE | **PRECOMBUSTION CHAMBER**

Bore	6.25 in	159 mm
Stroke	8.00 in	203 mm
Displacement	1964 cu in	32.2 litre
Engine Dry Weight (JWAC-H/E)	10750 lb	4876 kg
SRCR Generator Weight	4485 lb	2034 kg
Total Weight	15235 lb	6911 kg

STANDARD EQUIPMENT

Cooling System:
Expansion Tank
Seawater or Freshwater Pump
Jacket Water Pump

Fuel System:
Priming Pump
Transfer Pump
Fuel Filter
Flexible Fuel Lines

Lubrication System:
Oil Filter
Oil Cooler
Manual Sump Pump
Emergency Lube Oil Connection

Air & Exhaust System:
Dry Type Air Cleaners
Air Cleaner Service Indicator
Air Cleaner Inlet Adapter
Water Shielded Exhaust Manifold
Watercooled Turbocharger Shield

Control System:
UG8 Woodward Governor Group
Manual Shutoff Control

Safety System:
Oil Pressure and Water Temperature Contactors
Intake Manifold Temperature Contactors (Seawater and Seperate Circuited Engines Only)
Shutoff Group, Oil Pressure and Overspeed

Gauges & Instrument Panel:
Fuel Pressure
Inlet Manifold Air Temperature (2)
Lubricating Oil Pressure & Temperature
Exhaust (Stack) Temperature
Engine RPM
Jacket Water Temperature

Miscellaneous:
Front Accessory Drive
Dual Tachometer Drive
Mounting Rails—Floor Type
Service Hour Meter

ACCESSORY EQUIPMENT

Generator—SRCR:
60 Hz, 1200 RPM
400 kW Prime
230-460 Volt
3 Phase, 10 Wire, Wye Connection

Cooling System:
Heat Exchangers
Emergency Jacket Water Connections

Fuel System:
Duplex Fuel Filter

Air & Exhaust System:
Flexible Exhaust Fitting
Muffler

Starting System:
Air Starting
Hydraulic Starting
Electric Starting (24, 30, 32V) (2-wire Insulated System)
Alternator (24, 30, 32V)
Glow Plugs (24, 30, 32V)

Safety System:
Electric Shutoffs
Mechanical Shutoffs
Crankcase Explosion Relief Valves

Power Takeoff:
Front Enclosed Clutch
Auxiliary Drives
Front End Stub Shaft
Pulleys

Generator Set Society Certification:
American Bureau of Shipping
Det norske Veritas
Lloyd's Register of Shipping

D379 MARINE GENERATOR SET

RATINGS

Jacket Water Aftercooled—WS*

	rpm	kW	kVA
PRIME POWER—60 HZ	1200	400	500

	percent load	U.S. gph	litre/h
Fuel Rate	100	32.4	122.6
	75	24.6	92.9
	50	16.9	64.0
	25	9.6	36.4

*WS—Watershielded Manifold

RATING DEFINITION

PRIME POWER—For continuous electrical service.

RATING CONDITIONS

Ratings are based on SAE J816 standard conditions of 29.38 in Hg (99.2 kPa) and 85°F (30°C). These ratings also apply at DIN 6270 standard conditions of 97.8 kPa (28.97 in Hg) and 20°C (68°F).

Fuel consumption is based on fuel oil having an HHV of 19590 Btu/lb (45570 kJ/kg) and weighing 7.076 lb/U.S. gal (848 g/litre).

SRCR GENERATOR

Construction:
Revolving-field, single bearing AC generator with built-in, statically-regulated, statically-excited system. Built to IEEE-45 standards.

Excitation:
By rectified alternating current. Voltage buildup relay only moving part.

Regulation:
Volts per Hertz regulation. Silicon controlled rectifier. Transistorized voltage regulator with no moving parts, automatically maintains voltage within ±1% from no load to full load. No external voltage regulator needed. Shock mounted and epoxy encapsulated for protection against vibration and unfavorable atmospheric conditions.

Insulation:
High temperature Class F insulation in stator and rotor. Treated against abrasion and fungus deterioration with epoxy impregnation and an additional overcoat of asphaltic material.

Parallel Operation:
Equipped with reactive droop compensation.

Coupling:
Close-coupled, multiple steel disc type. Piloted shaft insures proper alignment and minimizes linear vibration.

Voltage Level:
Adjustable from rated voltage a minimum of ±5%.

Voltage droop:
Adjustable for proper division of reactive kVA when operating in parallel with other generators.

Voltage Gain:
Adjustable to compensate for engine speed variation when operating with a speed droop governor.

Marine Requirements:
Embedded temperature detectors and generator space heaters where required by Marine Societies.

Materials and specifications are subject to change without notice.

The International System of Units (SI) is used in this publication.

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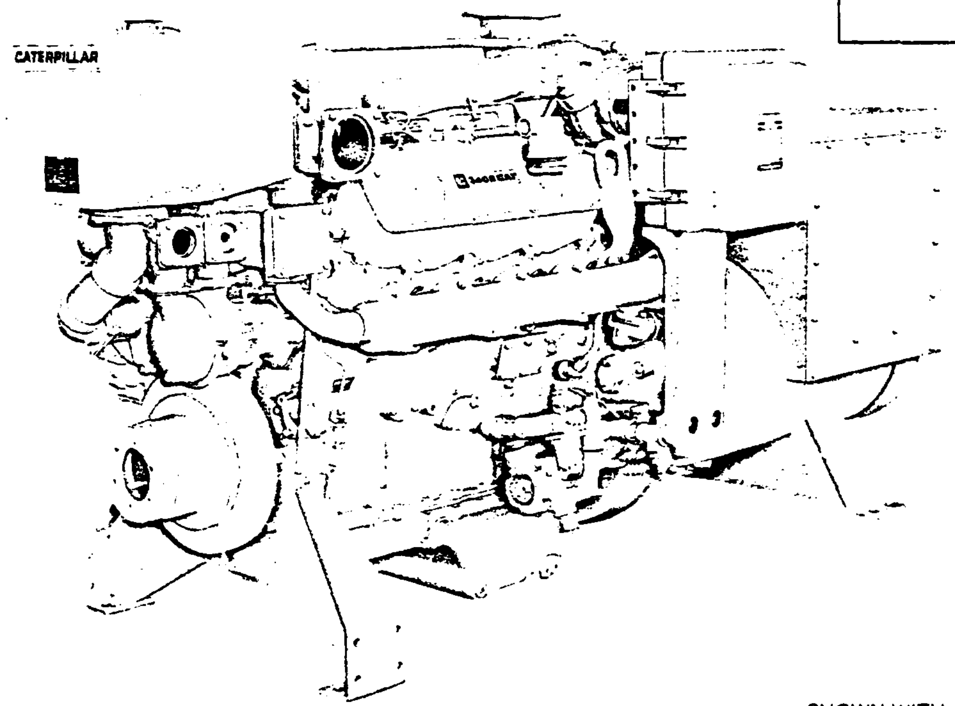
CATERPILLAR

3408

MARINE GENERATOR SETS



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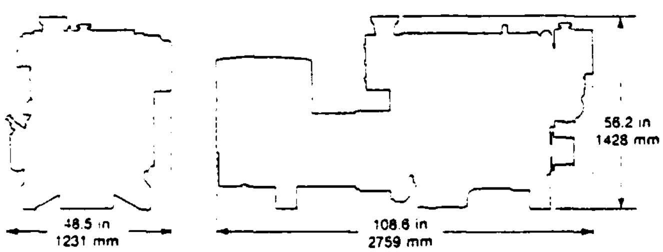

V-8	TURBOCHARGED &	
4 STROKE CYCLE	TURBOCHARGED AFTERCOOLED	
Bore	5.40 in	137 mm
Stroke	6.00 in	152 mm
Displacement	1099 cu in	18.0 litres
Engine Dry Weight	3480 lb	1578 kg
SR4 Generator Weight	2055 lb	933 kg
Total Weight	5535 lb	2510 kg

STANDARD EQUIPMENT

Cooling System:
Expansion Tank
Sea Water Pump
Jacket Water Pump

Fuel System:
Priming Pump
Transfer Pump
Fuel Filter
Flexible Fuel Lines

Lubrication System:
Oil Filter
Oil Cooler

Air and Exhaust System:
Dry Type Air Cleaner
Watercooled Exhaust Manifold
Watercooled Turbocharger

Control System:
Hydra-Mechanical Governor
Vernier and Positive Locking Control

Gauges and Instrument Panel:
Fuel Pressure
Lubricating Oil Pressure
Water Temperature

Miscellaneous:
Automatic Variable Timing
Vibration Damper
Supports
Service Meter

ACCESSORY EQUIPMENT

SR4 Brushless Generator For:

Precombustion Turbocharged Aftercooled Engine
60 Hz, 1800 rpm
260 kW Prime
240-480 Volt
3 Phase, 10 Wire, Wye Connection
50 Hz, 1500 rpm
230 kW Prime
200-400 Volt
240-480 Volt
3 Phase, 10 Wire, Wye Connection

Direct Injection Turbocharged Engine
60Hz, 1800 rpm
235 kW Prime
240-480 Volt
3 Phase, 10 Wire, Wye Connection
50 Hz, 1500 rpm
205 kW Prime
200-400 Volt
240-480 Volt
3 Phase, 10 Wire, Wye Connection

Cooling System:
Heat Exchangers

Air and Exhaust System:
Flexible Exhaust Fitting
Muffler

Starting System:
Air Starting
Hydraulic Starting
*Electric Starting (24, 30-32V)
*Alternators (24, 30-32V)
*Glow Plugs (24, 30-32V)

Control System:
Woodward PSG

Gauges and Instrument Panel:
Tachometer and Drive

Safety System:
Oil Pressure, Water Temperature and Overspeed Contactors
Electrical Shutoffs
Mechanical Shutoffs

Power Takeoff:
Auxiliary Drives
Front Enclosed Clutch

*Two Wire Insulated System

3408 MARINE GENERATOR SETS

RATINGS

TURBOCHARGED

	rpm	kW	kVA
PRIME POWER—60 Hz*	1800	235	293.8

	percent load	U.S. gph	litre/h
Fuel Rate	100	17.3	65.4
	75	13.3	50.4
	50	9.8	37.1
	25	5.9	22.4

TURBOCHARGED AFTERCOOLED

	rpm	kW	kVA
PRIME POWER—60 Hz*	1800	260	325.1

	percent load	U.S. gph	litre/h
Fuel Rate	100	20.8	78.6
	75	15.3	58.0
	50	11.0	41.5
	25	6.8	25.7

*Watercooled manifold

RATINGS

TURBOCHARGED

	rpm	kW	kVA
PRIME POWER—50 Hz*	1500	205	256.2

	percent load	U.S. gph	litre/h
Fuel Rate	100	14.6	55.2
	75	11.6	43.7
	50	8.3	31.5
	25	4.9	18.5

TURBOCHARGED AFTERCOOLED

	rpm	kW	kVA
PRIME POWER—50 Hz*	1500	230	287.5

	percent load	U.S. gph	litre/h
Fuel Rate	100	18.7	70.6
	75	13.7	51.9
	50	9.6	36.3
	25	5.8	21.8

*Watercooled manifold

RATING DEFINITION

PRIME POWER — For continuous electrical service.

RATING CONDITIONS

Ratings are based on SAE J816 standard conditions of 29.38 in Hg (99.2 kPa) and 85°F (30°C). These ratings also apply at DIN 6270 standard conditions of 97.8 kPa (28.97 in Hg) and 20°C (68°F).

Fuel consumption is based on fuel oil having a HHV of 19590 Btu/lb (45570 kJ/kg) and weighing 7.076 lb/U.S. gal (848 g/litre).

SR4 BRUSHLESS GENERATOR

Construction:
Revolving-field, single bearing AC generator, statically-regulated, with rotating brushless exciter. Built to IEEE-45 standard.

Excitation:
By rectified alternating current. Voltage buildup relay only moving part.

Regulation:
Volts per Hertz regulation. Silicon controlled rectifier. Transistorized voltage regulator automatically maintains voltage within ±2% from no load to full load. No external voltage regulator needed. Shock mounted and epoxy encapsulated for protection against vibration and unfavorable atmospheric conditions.

Insulation:
High temperature Class F insulation in stator and rotor. Treated against abrasion and fungus deterioration with epoxy impregnation and an additional overcoat of asphaltic material.

Parallel Operation:
Equipped standard with reactive droop compensation.

Coupling:
Close-coupled, multiple steel disc type. Piloted shaft insures precise alignment and minimizes linear vibration.

Voltage Level:
Adjustable from rated voltage a minimum of ±5%

Voltage Droop:
Adjustable for proper division of reactive kVA when operating in parallel with other generators.

Voltage Gain:
Adjustable to compensate for engine speed variation when operating with a speed droop governor.

Marine Requirements:
Generator space heaters where required by Marine Societies.

Materials and specifications are subject to change without notice.

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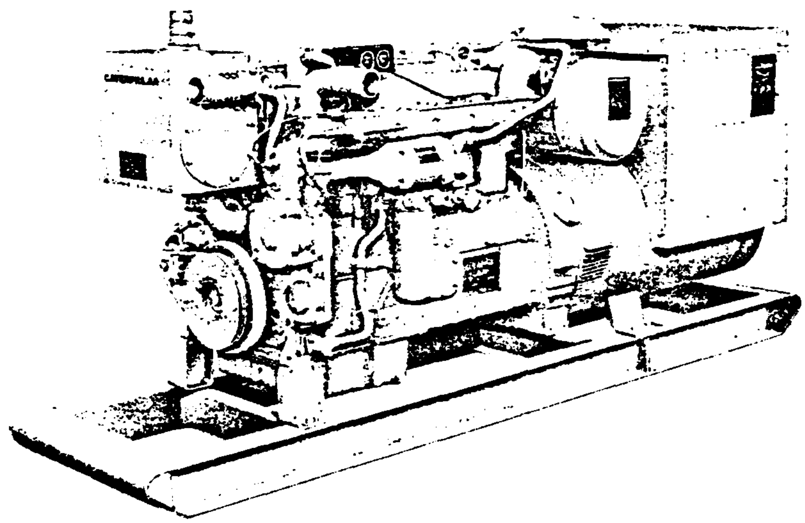
CATERPILLAR 3306

MARINE GENERATOR SET

TURBOCHARGED



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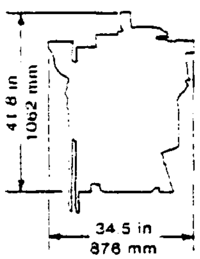

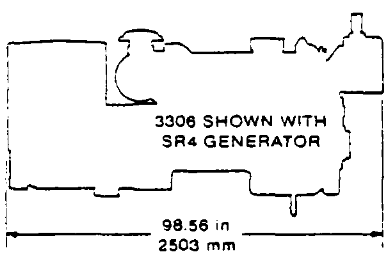

IN-LINE 6 — **TURBOCHARGED**
4 STROKE CYCLE — **PRECOMBUSTION CHAMBER**

Bore	4.75 in	121 mm
Stroke	6.00 in	152 mm
Displacement	638 cu in	10.5 litres
Engine Dry Weight	2075 lb	941 kg
SR4 Generator Weight	1390 lb	631 kg
Total Weight	3465 lb	1572 kg

STANDARD EQUIPMENT

Cooling System:
Heat Exchanger, Engine Mounted
Expansion Tank
Jacket Water Pump
Sea Water Pump (Not included with Keel Cooling Arrangement)

Fuel System:
Priming Pump
Transfer Pump
Flexible Fuel Lines
Fuel Filter

Lubrication System:
Oil Filters
Oil Cooler

Air and Exhaust System:
Dry Air Cleaner
Exhaust Manifold
Watercooled—60 Hz
Watershielded—50 Hz
Watercooled Turbocharger Shield

Starting and Control System:
Electric Starting, 24 Volt
Governor, Mechanical
Control, Vernier and Positive Locking

Safety:
Oil Pressure and Water Temperature Contactors

Gauges and Instrument Panel:
Fuel Pressure
Oil Pressure
Water Temperature

Miscellaneous:
Service Hour Meter
Lifting Eyes
Air Cleaner Rain Cap

ACCESSORY EQUIPMENT

Cat SR4 Brushless Generator:
60 Hz, 3 phase, 1800 rpm
135 kW prime, 240-480 Volt
10 Wire, Wye Connection
50 Hz, 3 phase, 1500 rpm
125 kW prime, 200-400 Volt
10 Wire, Wye Connection

Air and Exhaust System:
Precleaner
Air Cleaner Service Indicator (Single Stage Only)
Flexible Exhaust Fittings
Mufflers

Starting System:
Air Starting
Hydraulic Starting
Electric Starting (24, 30-32V)
Alternators (24, 30-32V) (2-wire Insulated System)
Insulated Glow Plugs (24, 30-32V)

Controls and Instruments:
Woodward Governor, PSG
Tachometer

Safety System:
Electric Shutoffs
Mechanical Shutoffs

Power Takeoff:
Auxiliary Drives
Front End Stub Shaft
Bilge Pump and Drive

Miscellaneous:
Manual Sump Pump
Base, Skid Type
Society Certification

RATINGS

	rpm	kW	kVA
PRIME POWER — 60 HZ*	1800	135	168.8

	percent load	U.S. gph	litre/h
Fuel Rate	100	11.3	42.8
	75	8.7	32.9
	50	6.0	22.6
	25	3.5	13.1

*Watercooled Exhaust Manifold

	rpm	kW	kVA
PRIME POWER — 50 HZ*	1500	125	156.3

	percent load	U.S. gph	litre/h
Fuel Rate	100	10.1	38.2
	75	7.6	28.8
	50	5.2	19.5
	25	3.0	11.4

*Watershielded Exhaust Manifold

RATING DEFINITION

PRIME POWER — For continuous electrical service.

RATING CONDITIONS

Ratings are based on SAE J816 standard conditions of 29.38 in Hg (99.2 kPa) and 85°F (30°C). These ratings also apply at DIN 6270 standard conditions of 97.8 kPa (28.97 in Hg) and 20°C (68°F).

Fuel consumption is based on fuel oil having an HHV of 19590 Btu/lb (45570 kJ/kg) and weighing 7.076 lb/U.S. gal (848 g/litre).

SR4 BRUSHLESS GENERATOR

Construction:
Revolving-field, single bearing AC generator, statically-regulated, with rotating brushless exciter. Built to IEEE-45 standards.

Excitation:
By rectified alternating current. Voltage buildup relay only moving part.

Regulation:
Volts per Hertz regulation. Silicon controlled rectifier. Transistorized voltage regulator, with no moving parts, automatically maintains voltage within ±2% from no load to full load. No external voltage regulator needed. Shock mounted and epoxy encapsulated for protection against vibration and unfavorable atmospheric conditions.

Insulation:
High temperature Class F insulation in stator and rotor. Treated against abrasion and fungus deterioration with epoxy impregnation and an additional overcoat of asphaltic material.

Parallel Operation:
Equipped with reactive droop compensation.

Coupling:
Close-coupled, multiple steel disc type. Piloted shaft insures precise alignment and minimizes linear vibration.

Voltage Level:
Adjustable from rated voltage a minimum of ±5%.

Voltage Droop:
Adjustable for proper division of reactive kVA when operating in parallel with other generators.

Voltage Gain:
Adjustable to compensate for engine speed variation when operating with a speed droop governor.

Marine Requirements:
Generator space heaters to meet Marine Society requirements.

Materials and specifications are subject to change without notice.

The International System of Units (SI) is used in this publication

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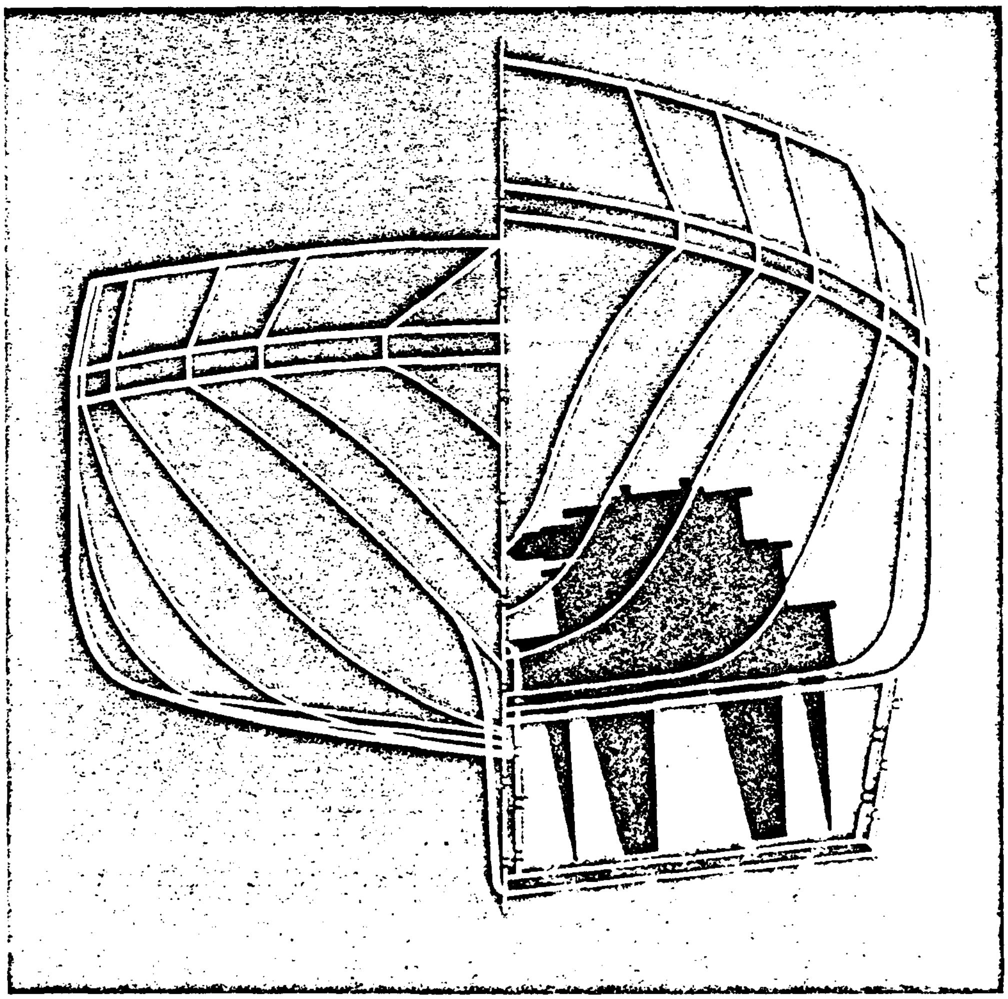
Recommendations for the Installation
of Voith-Schneider Propellers

VOITH

1584 e

Krupp International, Inc.
550 Mamaroneck Ave.
Harrison, N. Y. 10528
Tel. (914) 381-2000



In addition to other comprehensive publications on Voith-Schneider Propellers — briefly called VSP — this brochure contains recommendations for the choice of the propeller size and information on the main dimensions, the design of the propeller well, the transmission of power from the main machinery — diesel engine or electric motor — to the Voith-Schneider Propeller and the control stand.

Please write to us whenever you want to know more about this propeller. The specialists of our Marine Engineering Division are always available for consultation.

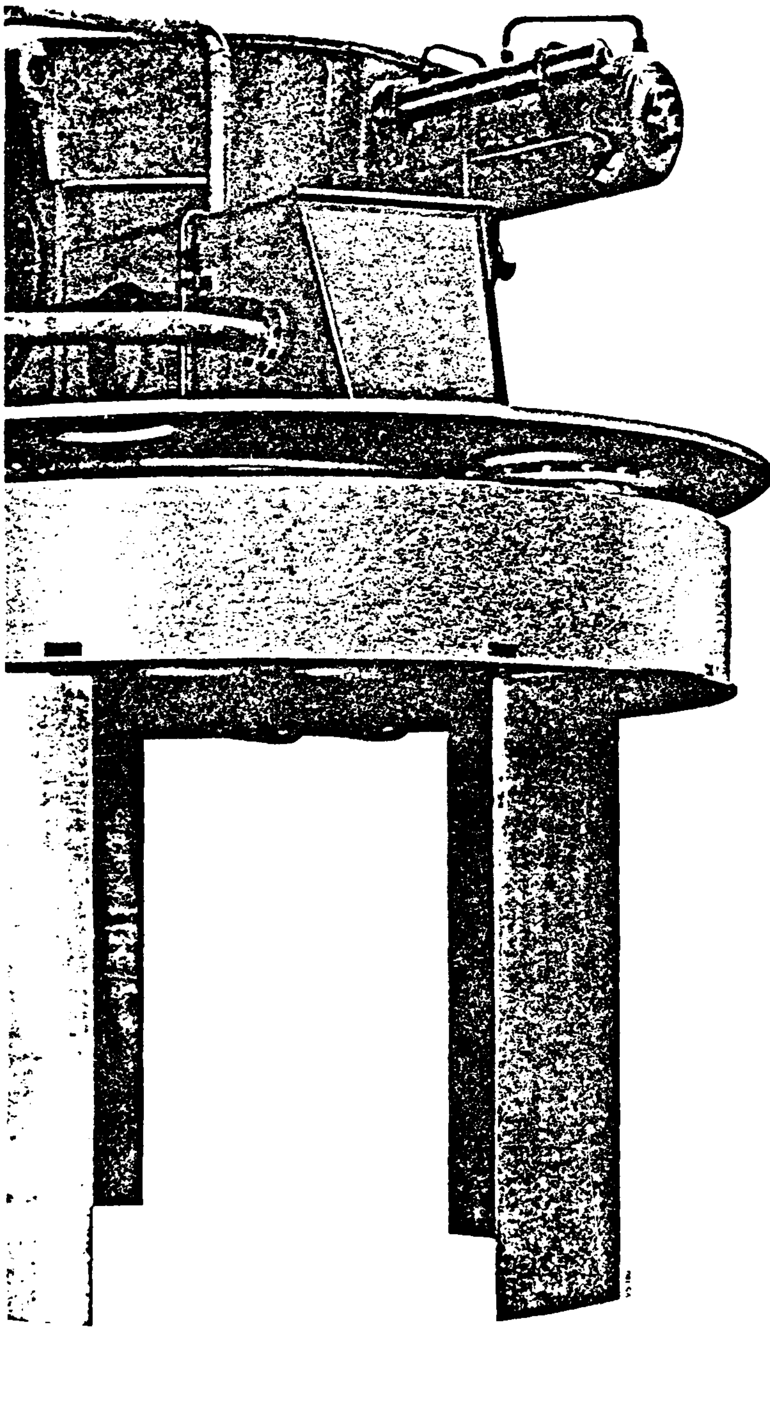
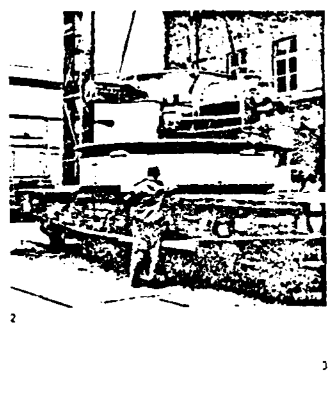


Fig. 1
Two size 28 G II/185 Voith-Schneider Propellers completely assembled in the workshops of our Marine Engineering Division.
Blade orbit dia 2.80 m, blade length 1.85 m. *Input shaft at the upper left, two-stage design.*

Fig. 2
A Voith-Schneider Propeller, with blades removed, loaded on a railway car.



2

3

The choice of propeller size

The size of the VSP is determined not only from hydrodynamic considerations, but also on its suitability for the mechanical loads which propeller thrust and torque exert on the blades and driving parts. As each case is judged individually, we must reserve the right to choose the propeller to be used. However, for consideration at the initial project stage, the permissible input horsepower (kW) as a function of the propeller size has been plotted in the *diagram, Fig. 3. Curve (a) applies to* propellers for tugs, drillships, floating cranes and similar vessels of comparatively high propeller loads. Curve (b), on the other hand, applies to low propeller loads as are generally encountered in free-running vessels, such as passenger ships, ferries, navy vessels etc.

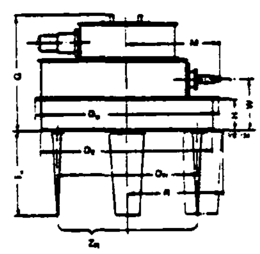
Main dimensions of the Voith-Schneider Propeller

The table at the foot shows the main dimensions (mm), the weights (kg), the moments of inertia (kgm²), referred to the vertical axis, as well as the oil filling (litres) for all propeller sizes of our present production programme.*) *Also see the dimensional sketches in* Figs. 4 to 7. A distinction is made between a "single-stage design" with bevel gear unit (Fig. 4) and a "two-stage design" with a spur gear unit preceding the bevel gear unit so that *large propellers can use high input* speeds.

Two-stage Voith-Schneider Propellers of size 36 and above are equipped with two or three input shafts. With two input shafts, a horizontal or vertical arrangement may be adopted. Fig. 6 shows the horizontal and Fig. 7 the vertical arrangement, which is particularly suited for use with electric motor drive.

Should the tabulated propeller weights exceed the available load-carrying capacities of the shipyard's cranes, the propellers would be delivered as two or three separate subassemblies — casing, rotor casing, blades — and finally assembled on board.

*) *The designation of the propeller size indicates the blade orbit diameter and the blade length. For instance, propeller size 20 E/125 has a blade orbit dia. of 2,000 mm and a blade length of 125 cm = 1,250 mm.*



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Prop. Size	D_a mm	D_{FL} mm	D_R mm	T_o mm	Z_{FL} mm	G mm
8 E	1106	800	1010	505	4	770
10 E	1390	1000	1274	653	4	970
12 E	1650	1200	1532	756	4	1114
14 E	1890	1400	1770	893	4	1248
16 G	2145	1600	2021	1007	4	1370
18 G	2405	1800	2263	1156	5	1468
20 E	2665	2000	2505	1256	5	1740
24 G	3160	2400	2970	1655	5	1905
26 G	3360	2600	3170	1655	5	1905
28 G	3680	2800	3480	1855	5	2080
32 G	4170	3200	3950	2006	5	2320
36 G	4750	3600	4490	2262	5	2830
40 G	5230	4000	4965	2262	5	2930
16 G	2145	1600	2021	1007	4	1370
26 G	3360	2600	3170	1655	5	1770
28 G	3680	2800	3480	1855	5	2000
32 G	4170	3200	3950	2006	5	2300
36 G	4750	3600	4490	2262	5	2700
40 G	5230	4000	4965	2512	5	2800

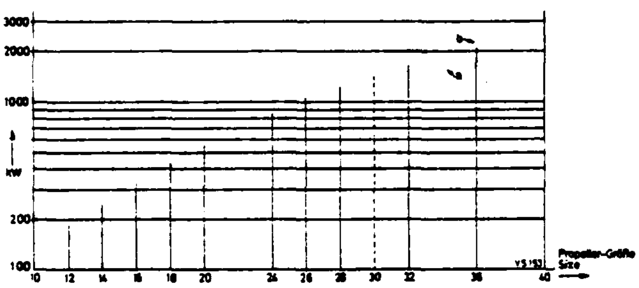

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Fig. 3
Relationship between propeller size and input horsepower. Curves a and b: see text.

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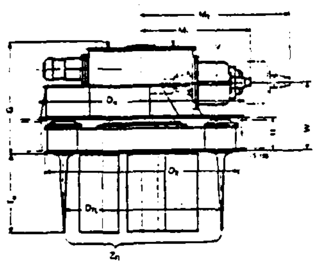

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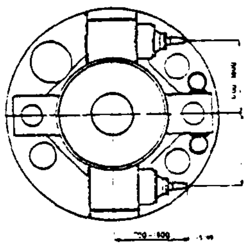

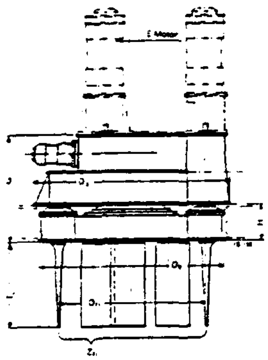

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Fig. 4
Dimensional sketch of a single-stage Voith-Schneider Propeller Z.. = number of blades.

Fig. 5
Dimensional sketch of a two-stage Voith-Schneider Propeller Z.. = number of blades. V = preceding gear unit, shafting offset 400 - 500 mm.

Fig. 6
Plan view of a two-stage Voith-Schneider Propeller with two horizontal input shafts.

Fig. 7
Dimensional sketch of a two-stage Voith-Schneider Propeller with two or three vertical input shafts for electric-motor drive.

W mm	H mm	M mm	M_1 mm	M_2 mm	Weight about kg	Oil filling about litres	Moment of inertia of rotor kgm^2	Gear unit	Propeller input speed*) single-stage	two-stage
300	185	520	–	–	860	80	42.5	single-stage	750-1500	–
395	242	700	–	–	1660	140	110	single-stage	600-1300	–
482	296	820	–	–	2600	240	340	single-stage	500-1000	–
550	336	970	–	–	3700	420	650	single-stage	450-900	–
635	383	1065	–	–	5600	550	1250	single-stage	400-800	–
900	419	1225	–	–	7800	850	2250	single-stage	350-700	–
795	496	1330	–	–	10700	1100	3400	single-stage	300-600	–
1230	575	1730	2015	2815	19500	1900	8000	single-stage and two-stage	275-500	650-1450
1230	575	1765	2050	2850	20600	2000	12500	single-stage and two-stage	250-350	600-1450
1330	670	1925	2365	3100	29000	2800	20000	single-stage and two-stage	230-400	500-1450
1480	690	2150	2365	3200	37000	4000	26500	single-stage and two-stage	200-300	450-1350
1900	900	2400	–	–	58500	5800	62500	consult Voith		
2000	1000	2400	–	–	65000	10000	125000	for design and speeds		
–	383	–	–	–	6700	60	1250	two-stage with 1 vertical input shaft	–	800-1450
–	575	–	–	–	23000	2000	12500	two-stage with 2 vertical input shafts	–	1000-1800
–	670	–	–	–	30000	3000	20000	two-stage with 3 vertical input shafts	–	900-1800
–	750	–	–	–	41000	3800	26500	two-stage with 3 vertical input shafts	–	900-1800
–	900	–	–	–	64000	6800	62500	two-stage with 3 vertical input shafts	–	750-1500
–	1000	–	–	–	80000	10000	125000	two-stage with 3 vertical input shafts	–	750-1200

*) The exact speed limits for specific applications must be established in consultation with us

Propeller well

The foundation for the Voith-Schneider Propeller, the propeller well, must form an integral part with the bottom structure of the vessel. The scantlings have to be such as to take the weight of the propeller and the thrust in all directions and to transmit weight and thrust to the ship's hull.

The dimensions of the well for each propeller (mm) and the permissible tolerances are given in the table. When determining the height of the well, it must be remembered that a flat seal, about 2 mm thick, of customary material, must be inserted between the well and propeller flanges.

Further particulars, especially regarding the installation of the propeller, are given in our Installation Manual which is made available before delivery of the propeller.

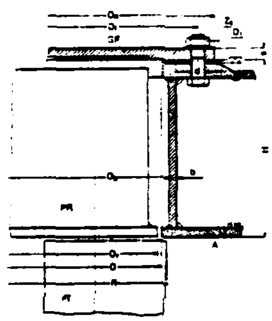
In special cases, the propeller can also be installed from below. We shall gladly put forward proposals for your particular project.

Fig. 8
Dimensional sketch of the propeller well

D_a = casing-flange outside diameter
s = casing-flange thickness
D_l = bolthole-circle diameter
Z_s = number of bolts
d = bolthole diameter
D_r = rotor-casing outside diameter
D = diameter of shell plate opening
D_b = well diameter
b = plate thickness of propeller well
H = height of well, including 2-mm flat seal

R = radius up to blade trailing edge with maximum blade deflection; dimensions given in separate drawing
PR = propeller rotor casing
A = shell plating
Di = 2-mm flat seal
Fl = propeller blade
GF = casing flange

Fig. 9
Plan view of propeller well. Stiffeners must be adapted to the ship's structures.



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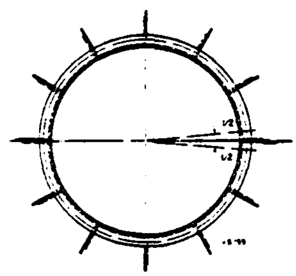

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Propeller Size	D_a mm	D_l mm	D_b mm	Z_s	D mm	D_r mm	H mm	d mm	s mm	b mm
8 E	1106	1076	1030	27	1016^{+3}	1010	185	14	15	6
10 E	1390	1350	1296	27	1282^{+3}	1274	242	16	18	8
12 E	1650	1613	1555	36	1540^{+4}	1532	296	18	20	9
14 E	1890	1850	1792	36	1780^{+4}	1770	336	18	20	10
16 G	2145	2110	2048	36	2032^{+5}	2021	383	18	22	11
18 G	2405	2360	2291	42	2275^{+5}	2263	419	23	24	12
20 E	2665	2620	2538	48	2518^{+5}	2505	496	24	26	13
24 G	3160	3105	3010	54	2990^{+5}	2970	575	27	30	14
26 G	3360	3305	3210	54	3190^{+5}	3170	575	27	30	14
28 G	3680	3610	3520	60	3500^{+6}	3480	670	27	35	15
32 G	4170	4100	4000	66	3970^{+5}	3950	690	33	40	16
36 G	4750	4670	4550	72	4515^{+6}	4490	900	39	50	18
40 G	5230	5150	5035	72	4995^{+6}	4965	1000	39	50	18

Fig. 10
Section of a propeller well with measuring jig.

Fig. 11
Sectional construction of a series of four Voith Water Tractors for the South African Railways, Durban. Shown in the photo is the section with the two size 32 G II/200 Voith-Schneider Propellers for a total power of about 4,000 hp.

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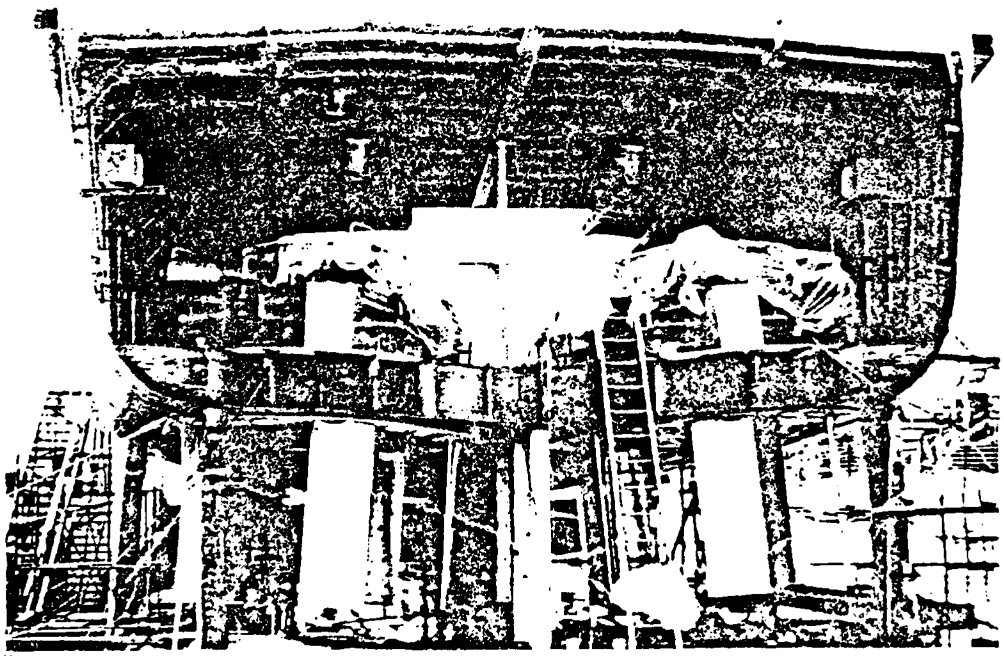


11

Main machinery

Interaction between diesel engine and Voith-Schneider Propeller

Within the power limits of Voith-Schneider propulsion today, the main machinery commonly used is the diesel engine which does not require reversing and may run at constant rpm. However, for economical operation under partial load the engine should be controlled by a speed governor which can be preset to give the engine rpm for the given propeller load.

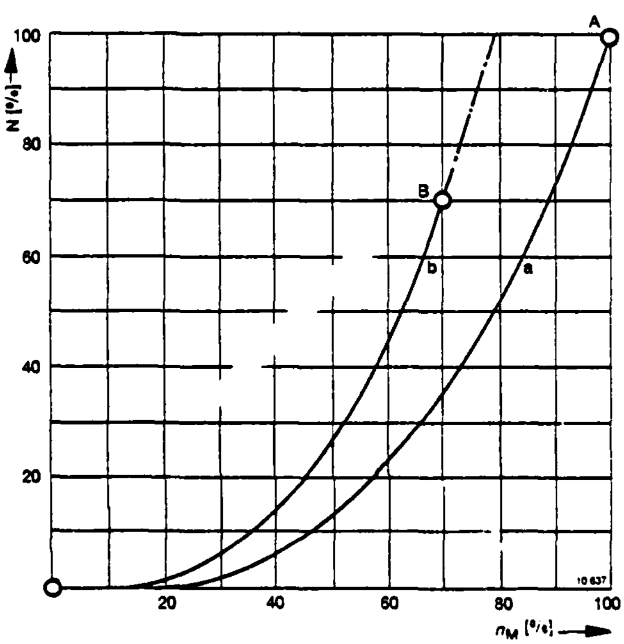
Electric drive may be chosen if extensive electric energy is needed for other purposes as for instance in floating cranes and drillships. As the input horsepower to the Voith-Schneider Propeller is controlled by means of the variable propeller pitch, robust and dependable three-phase ac motors (squirrel-cage motors) may be used.

When choosing the starting equipment for the electric motors it must remembered that the initial breakaway torque of the Voith-Schneider Propeller is about 25% of the rated torque. After starting the torque falls off considerably since the propeller is started at zero pitch. The torque then increases approximately as the square of the speed up to no-load rating (10 to 15% of rated power).

The input rpm of the Voith-Schneider Propeller can be chosen within certain limits to suit the reduction gear unit inside the propeller. The table on page 5 gives the approximate rpm limits for each propeller size, but we recommend that prospective customers approach us for the precise maximum and minimum permissible input rpm for their particular project.

The variable pitch of the Voith-Schneider Propeller enables the full power of the diesel engine to be used under all service conditions. This is shown in Fig. 12 where the propeller characteristics are plotted for two extreme cases: running free and at the bollard. A fixed-pitch propeller designed for the free running condition "A" absorbs maximum engine torque at the bollard "B" with only approximately 70% of the engine rpm. If the engine cannot develop extra torque then, assuming straight-line engine characteristics, only 70% of the rated engine horsepower is used. Under such conditions the towline pull is correspondingly decreased which is a considerable drawback in tugs.
With the Voith-Schneider propeller, however, the pitch can be reduced so that engine speed can be increased beyond point "B" up to point "A", where the engine will again develop the full power. The adjustable pitch is therefore ideally suited to offset the disadvantages of the practically linear rpm - power characteristics of a diesel engine under varying propeller loads. The propeller loading is in this case taken to be as $\frac{\text{power}}{\text{cube of rpm}} \mathrel{\hat{=}} \left[\frac{N}{n^3}\right]$

If, on the other hand, the ship's speed changes at practically constant propeller loading, as is generally the case in free-running conditions, the absorbed power should not be regulated solely by a corresponding pitch adjustment at constant engine rpm. An attempt should always be made to approximate the optimum overall efficiency of the combination of diesel engine and propeller. Achieving the exact optimum efficiency is only possible through relatively complicated control mechanisms which are economical only for vessels travelling a long distance. They are not justified in vessels which for most of their time are manoeuvring — a category in which Voith-Schneider propulsion is generally installed. In these cases partial loading should mainly be achieved by a corresponding reduction in engine speed. In Fig. 13 both alternatives are compared: power reduction by pitch adjustment and also by change in engine rpm for a partial loading of 55%. It may be seen that the pitch has to be reduced substantially if this method alone is used to reduce the power. The general effect of this is a slight reduction in propulsive efficiency if the optimum propeller pitch was chosen for



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the design point. Furthermore, the engine would not be operating under the most economical conditions when running at full speed with the torque reduced to about 55%. On the other hand, if the propeller pitch is kept at its optimum value, the speed must, for the assumed loading of 55%, be reduced to about 82% of the rated speed, while the engine torque would be simultaneously reduced to about 67%. As compared with the first alternative, this would result in more favourable operating conditions both for the propeller and the engine.

Evidently the pitch will always be used *to control the power for conditions* below the lowest permissible engine speed and when manoeuvring. Regarding the power control of VSP vessels with diesel machinery the following rules will apply:

Pitch control will be used

a) with varying propeller loading (free-running — towing),

b) for manoeuvring

c) under operating conditions below the lowest permissible engine speed

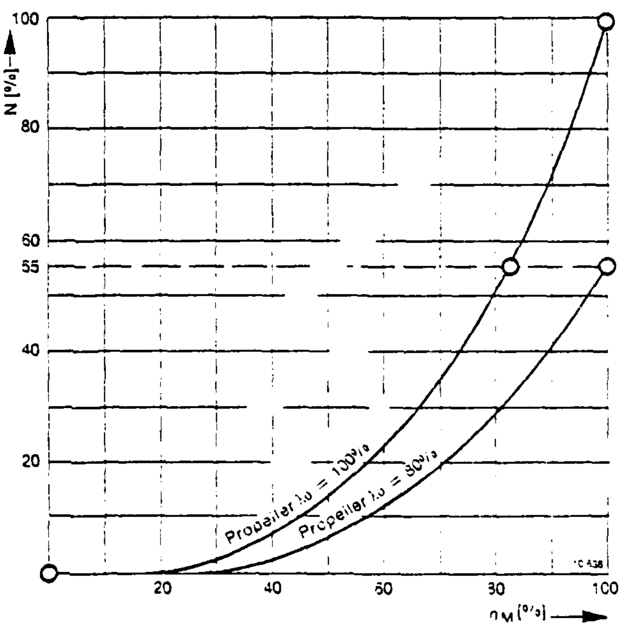
Rpm control is used for partial engine loading with constant propeller loading (varying speeds with the vessel running free).

Fig. 12
Propeller and engine characteristics

- N power
- n_M engine rpm
- a power absorbed by propeller in free running conditions at 100% pitch
- b power absorbed by propeller in bollard conditions (zero speed) at 100% pitch
- A design point
- B see text page 8
- M_{dM} torque developed by diesel engine

Fig. 13
Partial load operation

- N power
- n_M engine rpm
- M_{dM} torque developed by diesel engine
- λ_o propeller pitch



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Shafting

When designing the shafting between engine and Voith-Schneider Propeller the propeller gear unit(s) must be protected from inadmissible peak loads resulting from torsional vibrations as well as from starting and stopping shocks. Because of the comparatively large moment of gyration of the Voith-Schneider Propellers, shock stresses in particular may be extremely high on the shutdown of the diesel engine.

The best solution to avoid these peak stresses is to install a turbo (fluid) coupling of the Föttinger type in the shafting to ensure shock-free starting and stopping. This coupling protects the shafting from vibrations coming from the diesel engine since it subdivides the whole propulsion system into two vibrational systems. Two types of turbo coupling are available:

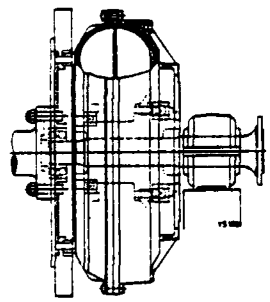
a) Constant-filling type turbo coupling (Fig. 14).

b) Drain-type turbo coupling (Fig. 15).

For the majority of applications the constant-filling type turbo coupling will meet requirements; this coupling requires no maintenance and operates without pump and cooler. When higher torques are encountered and when disconnection of the propeller from the main machinery is required, preference is given to the drain-type turbo coupling.

If certain reasons preclude the application of turbo couplings, a mechanical clutch coupling, engageable with the equipment in operation, should be installed. This coupling can at least partly protect the propeller gearing from starting and stopping shocks originating from the diesel engine.

Propeller pinion shaft and the adjoining shafting should always be connected by a coupling which can compensate for inaccuracies in alignment (bow-toothed coupling, flexible coupling, or cardan shaft). This arrangement avoids excessive stressing of the propeller pinion-shaft bearings due to inaccuracies in alignment, elastic deformation of the hull or thermal expansion of the shafting itself. Cardan shafts or universal joint couplings will be used mainly when the torques in the shafting are not excessive and when an axial or angular compensation between propeller pinion shaft and engine shaft is required.



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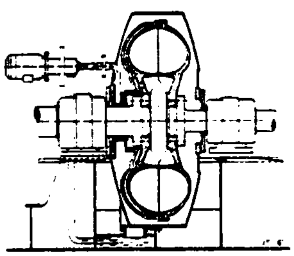

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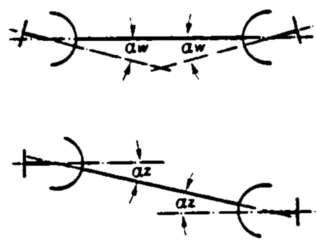

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Fig. 14
Turbo coupling of the constant-filling type

Fig. 15
Drain-type turbo coupling

Fig. 16
Arrangement of cardan shafts

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The cardan shafts are generally arranged either in "W" or "Z" form (Fig 16), but in either case it is essential that the angles at both ends are the same. The angles should not be less than about $1^1/_2°$ to ensure satisfactory lubrication of the universal joints. The magnitude of the angle affects the service life of the joints. As upper limit we recommend an angle of about 8° for ordinary ship's installations.

However, in the case of all couplings of the bow-toothed type or when cardan shafts are used, it is essential to keep the shaft bearing as close as possible to the coupling. One bearing of the main shaft should be designed as a locating bearing for axial guiding of the shaft and the rest as floating bearings.

The shafting must be free from critical torsional vibrations within the entire operating range. For installations fitted with turbo couplings the engine supplier must investigate the system: engine — primary half of turbo coupling and guarantee satisfactory operation. We investigate the system: secondary half of turbo coupling — Voith-Schneider Propeller, since only excitations induced by the Voith-Schneider Propeller play a part in this system. If no turbo coupling is installed, the engine supplier must investigate the whole system: engine — Voith-Schneider Propeller. The moments of inertia for Voith-Schneider Propellers, including entrained water masses, are given in the tables on pages 4 and 5. These moments of inertia are referred to the vertical rotor axis. The moment of inertia referred to the pinion shaft is obtained from the following formula:

$$J_{pinion\ shaft} = J_{rotor} \left(\frac{n_{rotor}}{n_{pinion\ shaft}} \right)^2 \ \mathrm{kgm}^2$$

For each application the precise rotor rpm is given by us. The rotor speed can be roughly estimated from the following formula:

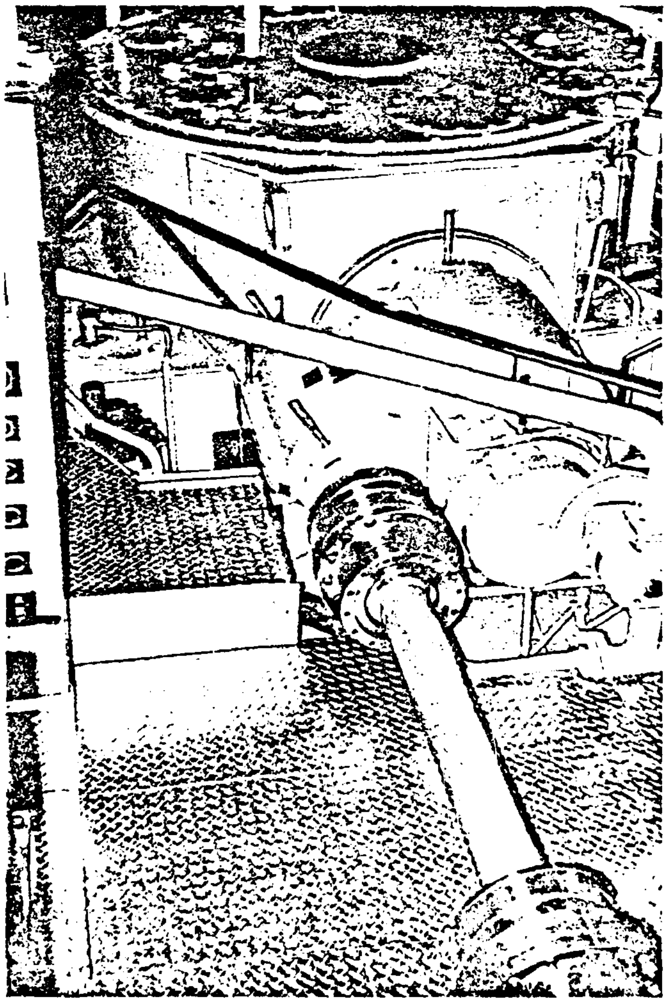
$$n_L = \frac{185}{D_{cl}}, \text{ where}$$

n_L = rotor speed in min^{-1}

D_{cl} = blade orbit diameter in m.

Pages 12 and 13 show some typical shaft arrangements which may be used as a guideline for project engineers.

Fig. 17
Shafting. Voith-Schneider Propeller with preceding gear unit connected to a split gear coupling with intermediate shaft.



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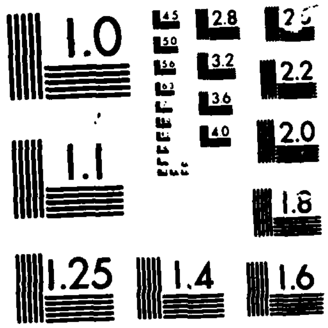

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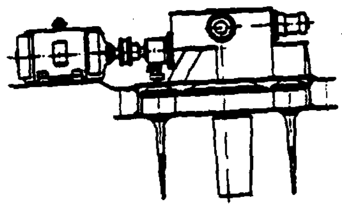
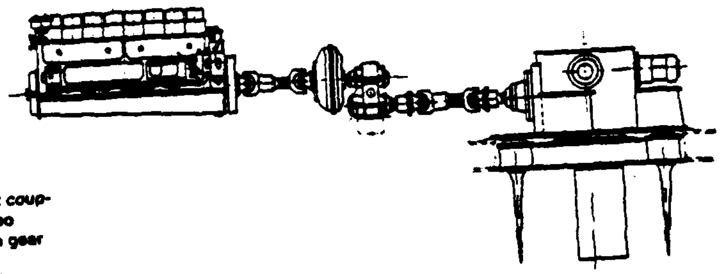
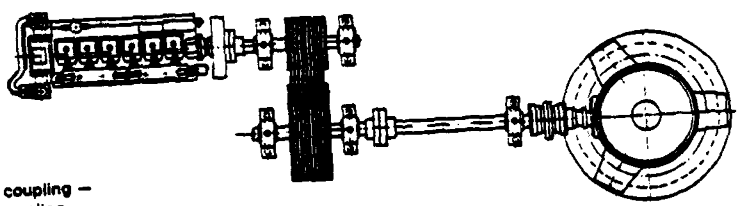
Typical shaft arrangements



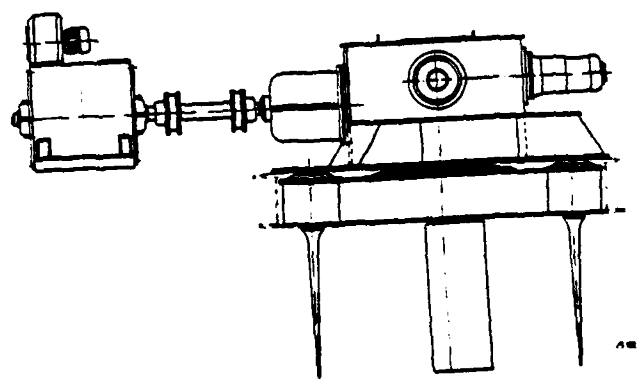
Electric motor — flexible coupling — Voith-Schneider Propeller



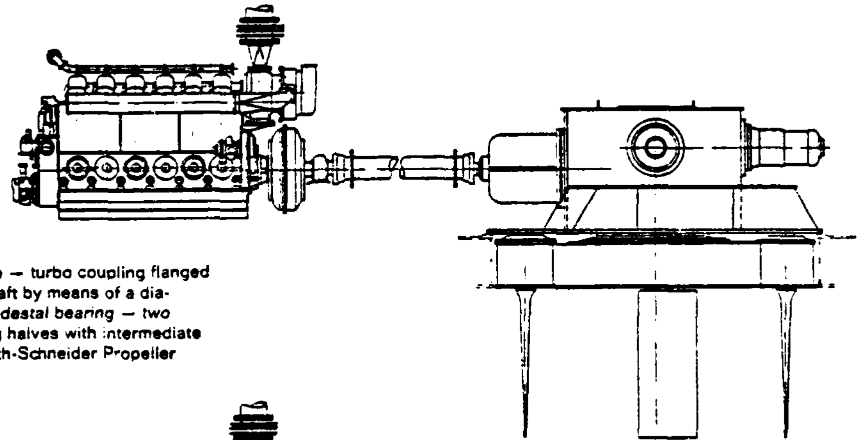
Diesel engine — universal joint coupling — constant-filling type turbo coupling, installed overhung on gear input shaft — spur gear unit — universal joint coupling — Voith-Schneider Propeller



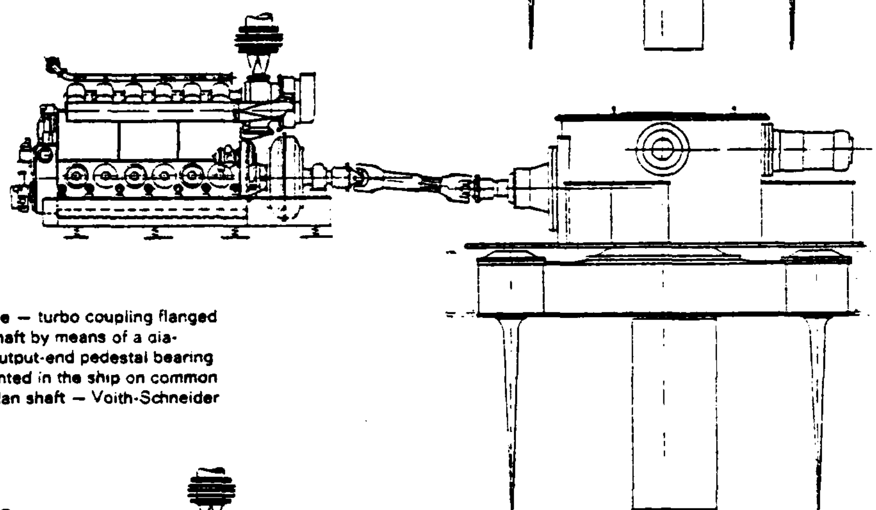
Diesel engine — clutch coupling — Vee-belt drive — gear coupling — Voith-Schneider Propeller



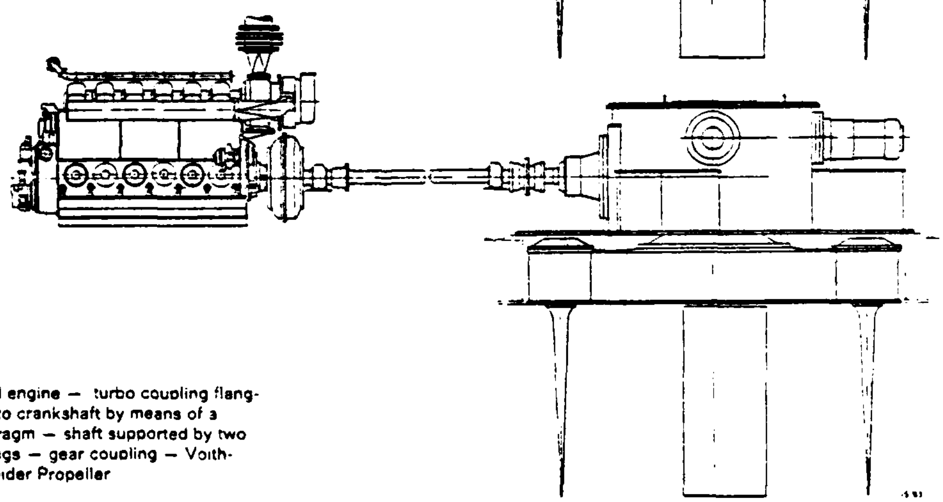
Electric motor — two flexible couplings with intermediate shaft — Voith-Schneider Propeller



Diesel engine — turbo coupling flanged onto crankshaft by means of a diaphragm — *pedestal bearing* — two gear coupling halves with intermediate shafts — Voith-Schneider Propeller



Diesel engine — turbo coupling flanged onto crankshaft by means of a diaphragm — output-end pedestal bearing flexibly mounted in the ship on common base — cardan shaft — Voith-Schneider Propeller



Diesel engine — turbo coupling flanged onto crankshaft by means of a diaphragm — shaft supported by two bearings — gear coupling — Voith-Schneider Propeller

Control stand and control rod gear

The Voith-Schneider Propeller thrust is controlled by variation of the blade pitch according to two rectangular co-ordinates (components), one of which lies in the ship's longitudinal direction and the other athwartships. The longitudinal component is usually called speed pitch, the transverse component steering pitch.

Depending upon the propeller arrangement, the speed and steering pitches are combined to simplify the control of the ship. In single-propeller ships the control stand is fitted with a lever for longitudinal pitch adjustment and a steering wheel for transverse or steering-pitch adjustment (Fig. 18a). In principle it would be possible to adjust the transverse component by a lever. However, experience has shown that the more sensitive steering wheel—with six rotations "hard-over" to "hard-over" is more advantageous for keeping a vessel on course.

With two propellers arranged side by side, the transverse components of both propellers are combined and adjusted jointly by one steering wheel. The speed components of both propellers can be adjusted independently by one speed lever each (Fig. 18b).

With double-ended vessels, having one propeller forward and one aft, the speed components of both propellers are usually combined and adjusted jointly, whereas the transverse or steering components of both propellers are adjusted independently, each component by a separate steering wheel (Fig. 18c). Write for our description of the operation of Voith-Schneider propelled ships.

With a short distance between bridge and propeller, remote control is accomplished by a mechanical push-pull rod gear which is usually included in our delivery. With long distances between bridge and propeller and when several control stands are installed, we recommend the application of hydraulic remote control systems. In many cases, robust and dependable manual hydraulic control will meet the specified requirements. Pneumatic and electric remote control systems can also be used. Our specialists will be pleased to advise on the relative merits.

In special cases it may also be necessary to operate the propellers with automatic control. The solutions we can offer for such applications have been successfully tested under service conditions.

The levers and wheels mounted on the control stand(s) must be arranged in such a manner as to ensure the ship's movement is analogous to the movement of the control stand transmitters and to preclude any confusion in the control of a multiple propeller installation.

Fig. 18
Control stand for vessels

a) with one Voith-Schneider Propeller

b) with two Voith-Schneider Propellers arranged side by side

c) with double-ended vessels with one Voith-Schneider Propeller at the bow and one at the stern.

a

b

c

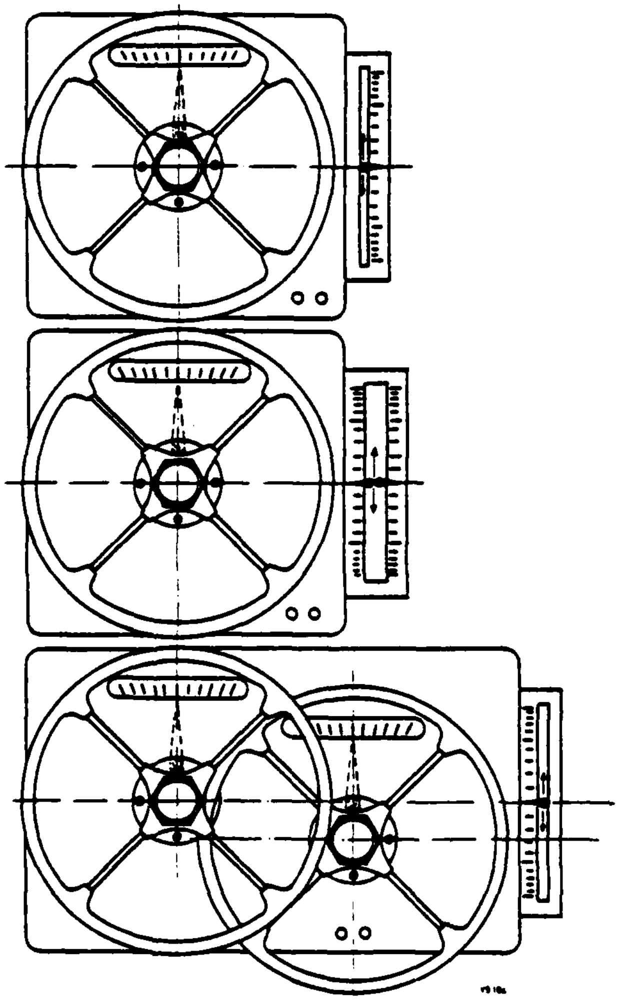


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Fig. 19
Typical example showing an arrangement of a mechanical push-pull rod gear system.

Fig. 20
Wheelhouse of a Voith Water Tractor with free-standing control stand

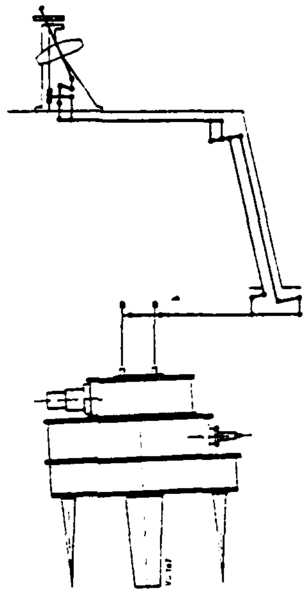

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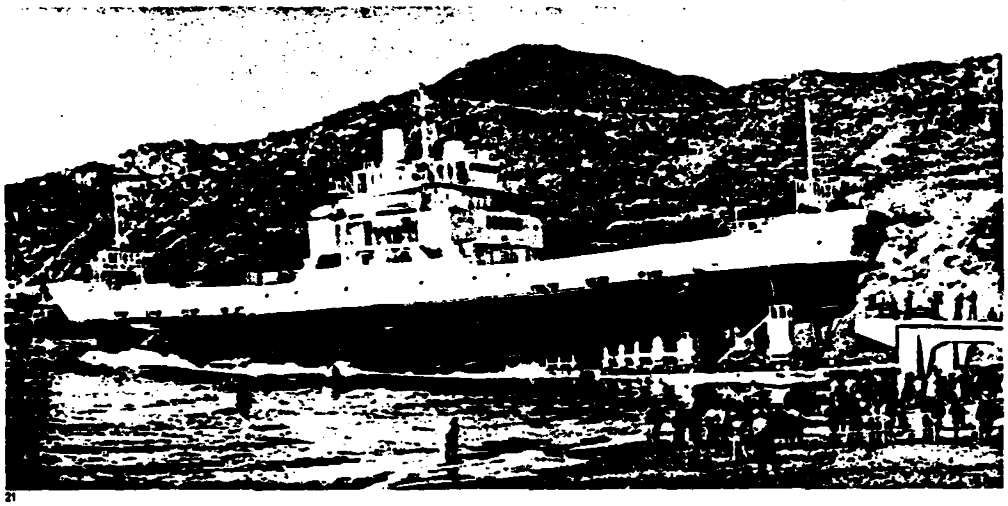
Fig. 21
Launch of a double-ended ferryboat for the Straits of Messina, equipped with two Voith-Schneider Propellers



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Voith Group

J. M. Voith GmbH
Postfach 1940
D-7920 Heidenheim

J. M. Voith GmbH
Werk Bremen
D-2800 Bremen 13
Waterbergstraße 11

Voith Getriebe KG
Postfach 1920
D-7920 Heidenheim

Voith Getriebe KG
Werk München
Postfach 2020
D-8046 Garching b. München

Voith Turbo KG
Postfach 460
D-7180 Crailsheim

O. Dörries GmbH
Postfach 585
D-5160 Düren

Johann Fischer
Postfach 1120
D-5204 Lohmar 1

B. Maier KG
Postfach 140640
D-4800 Bielefeld 14

Emil Blaschke & Co. GmbH
Postfach 2207
D-7056 Weinstadt-Endersbach

J. M. Voith AG
Postfach 168
A-3100 St. Pölten/Österreich

Pégard S. A.
59, Av. Reine Elisabeth
B-5220 Andenne/Belgique

Voith-Tolosa S. A.
P. Larramendi-9
Tolosa (Guipúzcoa) / España

Voith-Allis Inc.
P. O. Box 318
3121 West Spencer Street
Appleton, Wisconsin 54911
USA

Voith-Morden Inc.
3420 S. W. Macadam Avenue
Portland, Oregon 97201/USA

Voith S. A.
Máquinas e Equipamentos
Caixa Postal 30 216
São Paulo/Brasil

Utkal Machinery Limited
P.O. Kansbahal
Dist. Sundergarh, Orissa
India

Voith-Druck 3 76 3000

6 April 78
Page 1

10' X 32' SIX MAN LIVING QUARTERS, ERECTED

Elder skid mounted building with lifting lugs. White fire retardant fiberglass roof and exterior wall surface. Fire retardent fiberglass under floor surface. Prefinished paneling in sleeping area. White plymetal in bath and kitchen area. White vinyl ceiling. Linoleum floor covering in sleeping area and fiberglass floor covering in bath and kitchen. Elder fiberglass heavy duty doors. Refer to Elder Drawing No.ES-2164.

Building Price: $ 13,813.00

SKID: Two full length runners of 8WF X 17 lb. steel beams with three WF beam crossmembers. Skid ends of 4" schedule 80 steel pipe. Floor joists of 2 1/2"X 2 1/2" X 1/4" steel angle on 24" centers. Perimeter support of 2 1/2" X 2 1/2" X 1/4" steel angle. All welded construction. Skid to be dirtcoated.

FLOOR: 3/4" A/C exterior grade fir plywood attached to crossmembers with self tapping screws. Floor covering shall be 1/8" tan fiberglass reinforced resin, except in sleeper, which shall be linoleum. Bottom undercoated with fire retardant fiberglass.

EXTERIOR WALLS: 2 1/8" laminated panel wall consisting of 1/4" A/C exterior grade fir plywood on the outside bonded to 1 1/2" of high density, flame retarded polystyrene foam core. Interior of 1/4" prefinished plywood except in bathroom and kitchen which shall be white plymetal, which in turn is bonded to the polystyrene foam core. The exterior is completely fiberglassed together with the roof, white, with a mixture of polyester resin and chopped fiberglass sprayed uniformly over the complete wall surface to form a smooth, jointless, weatherproof homogeneous surface. Exterior fiberglass coating is fire retardant.

ROOF: Joints are radius cut 2" X 6" nominal wood framing members at 16" OC. Exterior cladding of 3/8" AC exterior grade plywood. 3 1/2" thick fiberglass insulation layed between joist. The exterior is completely fiberglassed together with the walls using the same material as stated above. All ceilings shall be white vinyl.

ADHESIVE: The adhesive is a high strength, synthetic base contact material designed for bonding sandwich building panels. A high test heat resistant material where loads must be maintained for extended periods of time at elevated temperatures and with good resistance to low temperatures and water submersion. Adhesive meets Military Specifications MIL P-8053 B and passes the Forest Products Laboratory Test.

POLYSTYRENE CORE: The core shall be a fire resistant, self-extinguishing expanded polystyrene with a C value of not more than 0.15.

ASSEMBLY: All wall sections shall be bolted to the perimeter with countersunk 3/8" cadmium plated cap screws on 24" centers.

DOORS: The doors shall be Elder fiberglass doors mounted with stainless steel piano hinges on galvanized steel frames. Latching hardware shall be Kason #877 padlocking pull handle set. Aluminum drip hood shall be installed over each door.

WINDOWS: Windows shall be aluminum framed with D.S.B. glass and aluminum screens. Size as specified.

WIRING: 120/208 volt, 60 cycle, 1 phase. Unless otherwise specified, surface mounted conduit, and outlets. Convenience outlets 20 amps, 120 volt, duplex grounding type. All circuits breaker protected. All electrical items NEMA rated and installed in accordance with the National Electrical Code. Type and amount of fixtures as specified. All wiring to be insulated copper wiring. Panel box mounted on wall with conduit to bring in power cable from outside structure.

PLUMBING: All supply lines shall be copper, all waste lines, A.B.S. plastic pipe.

GENERAL: All ceiling heights minimum of 7'9".

EQUIPPED WITH THE FOLLOWING:

3	Beds, steel frame, double bunk, 36" X 75"
6	Mattresses, 250 coil, 36" X 75"
3	Lockers, double tier steel
1	Range, 30", domestic
1	Range hood, 36" domestic
1	Table with plastic top, 30" X 72"
4	Chairs, steel folding padded seat
1	Refrigerator with freezer, 12 cu. ft.
1	Double compartment sink, s.s. w/hot,cold & potable faucets
1	Base cabinet, 5 ft.
1	Wall cabinet, 5 ft.
1	Water heater, 42 gallon
1	Elder shower, heavy duty aluminum, curtain and soap dish
1	Commode, tank type
1	Lavatory with mirror, light and shelf w/hot,cold & potable water faucets
2	Exhaust fans, 12"
1	Air conditioner with heat, 28,000 BTU cool
1	Lot duct work

Equipment Price: $ 10,035.00

NET TOTAL PRICE, F.O.B.
DELIVERED, HUMBLE TEXAS: $ 23,850.00
EST FRT TO LA 1600.
25,450. -

ESTIMATED WEIGHT: 20,000 lbs.
ESTIMATED CUBE: 3,100 cu. ft.
ELECTRICAL LOAD: 25 KW @ 120/208/1/60

Microphor

HOW THE SYSTEM WORKS

The Microphor sewage treatment system which can use either fresh or salt water, is a biological system in which solids are reduced to harmless carbon dioxide and liquid.

Bacteria introduced into the treatment tank by the deposit of waste from the toilet, live and multiply in the columns of filtering media inside the tank. The bacteria reduce sewage waste and toilet tissue to a liquid which is filtered through the columns. The effluent is then sterilized by washing the liquid across the chlorine tablets in the chlorinator which destroys the bacteria. The effluent is discharged by gravity flow directly overboard. If gravity flow is impractical, effluent can flow to a below water line sump and be pumped overboard.

The Microphor sewage treatment system using an "aerobic" biological action to digest waste does not produce dangerous gases.

NO CHEMICALS OF ANY SORT SHOULD BE ADDED TO THE TREATMENT TANK AT ANY TIME.

Microphor systems are sized to the amount of people using the unit (see typical installation sketch). If the system ever becomes overloaded it may be cleaned out through the cleanout plug. A water hose can be used to to liquify the waste while pumping and caution should be taken not to damage the filtering columns.

P.O. Box 490 ☐ Willits, California 95490 ☐ (707) 459-5563

Microphor

HANDLING AND STORAGE OF MICROPHOR CHLORINE TABLETS (P/N 73-98-703)

We would recommend keeping the unopened bags of chlorine tablets in a plastic bucket or container with a tight fitting lid in a cool dry place.

The following precautions should be followed:

DANGER - POISON

EXTREMELY HARMFUL IF SWALLOWED. Do not get into the eyes, skin or on clothing. Do not inhale dust; irritating to the eyes, skin, nose, throat and lungs.

ANTIDOTE - INTERNAL: Feed rice gruel or cooked cereal, followed by doses of olive oil or cooking oil. CALL A PHYSICIAN.

ANTIDOTE - EXTERNAL: Flood the area of contact with water. If contact area is the eyes, flood immediately with water for 15 minutes duration. CALL A PHYSICIAN.

OXIDIZING MATERIAL. Contact with organic matter or high temperature may cause decomposition and result in the release of chlorine gas and other toxic gases. Store in a cool, dry ventilated area away from flammable material. Contact with heat, moisture, foreign materials or contamination from any source may result in fire. Clothing or vegetation contaminated by this concentrated, dry chlorine product are extremely flammable. Remove and wash contaminated clothing promptly. Flood generously with water, contaminated vegetation. Do not re-use empty container. Thoroughly rinse the container before disposal.

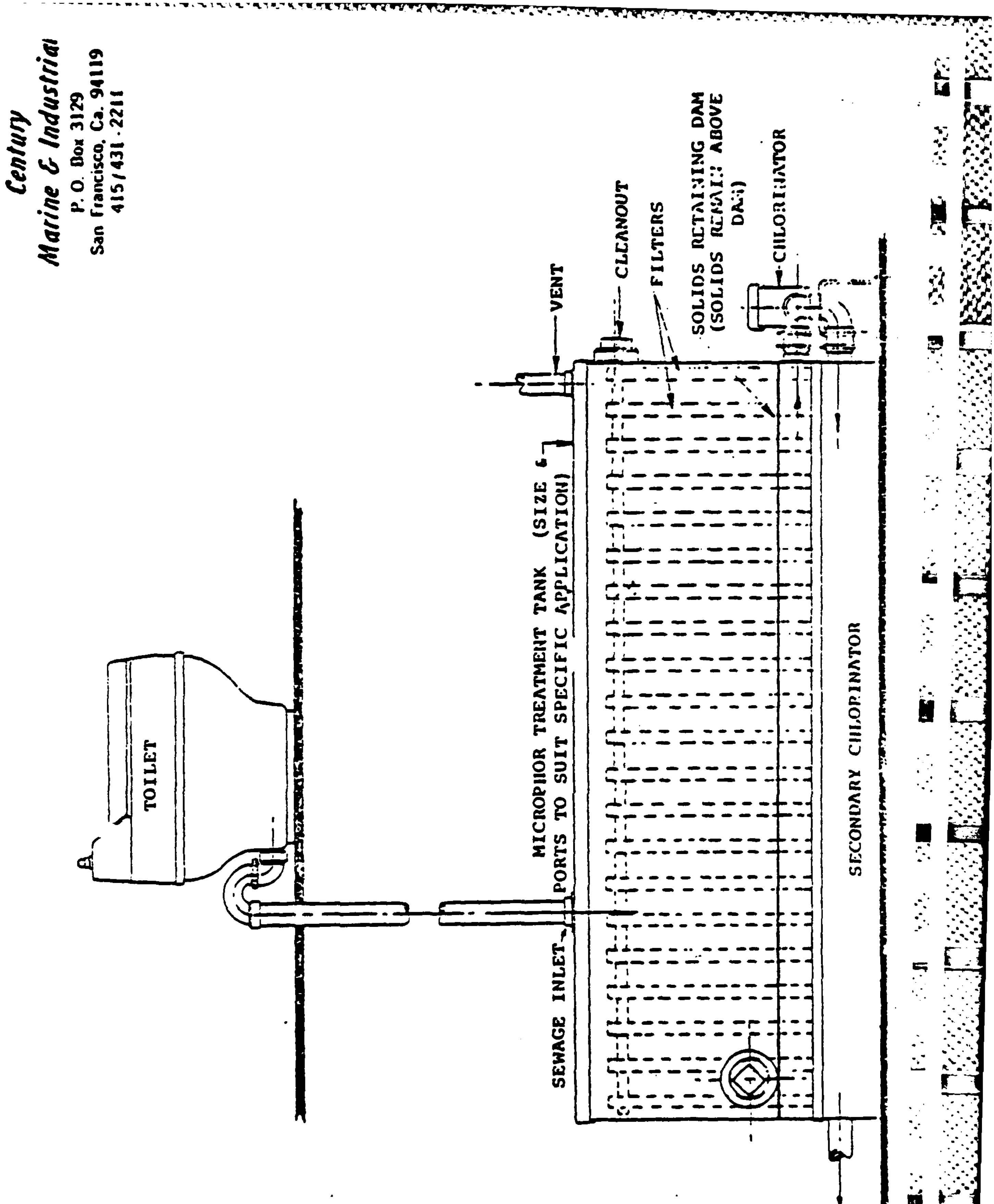
P.O. Box 490 □ Willits, California 95490 □ (707) 459-5563

CLEANING TOILETS

Use non-abrasive biodegradable cleaners such as Fantastic, Ivory Snow, Formula 409, Mr. Clean, and Janitor In A Drum. Sanitizers like Lysol or Hexol are not to be used. The carbolic or kreosote base sanitizers when they are flushed into the treatment tank stop the biological action.

TREATMENT TANK

Microphor treatment tanks are biological digesters and are designed for disposal of human waste products and toilet tissue only. Do not put any other item or material into the system.



TYPICAL MICROPHOR MARINE SEWAGE TREATMENT SYSTEM

Prices Effective January 1, 1977

MICROPHOR SEWAGE TREATMENT SYSTEMS

WITH CONVENTIONAL TOILETS (Models w/Microphor Toilets - see other side)

+10%

Model #	Crew Size	Nominal Dimensions	Type I *	Type II *
MC-50	5	31"W X 30"H X 56"L	1,560.00	1,950.00
MC-100	10	31"W X 30"H X 80"L	2,070.00	2,585.00
MC-150	15	40"W X 30"H X 96"L	2,658.00	3,320.00
MC-200	20	48"W X 32"H X 110"L	3,350.00	4,185.00
MC-300	30	48"W X 37"H X 136"L	4,740.00	5,925.00
MC-500	50	60"W X 37"H X 210"L	6,075.00	7,600.00
MC-600	60	66"W X 37"H X 210"L	8,775.00	10,968.00
MC-800	80	72"W X 45"H X 240"L	13,750.00	17,187.00
MC-1000	100	72"W X 45"H X 288"L	18,785.00	23,435.00

* ALL MODELS ARE U.S. COAST GUARD APPROVED WITH LABEL OF CERTIFICATION NUMBERS.

SUMP/PUMP ACCESSORIES (Optional) **

Standard Sump and Pump Assembly	875.00	$925.00
Standard Sump and Two Pump Assemblies	1,305.00	$1500.00
Large Sump W/Two Pumps and Alternator	1,985.00	

** Needed only if gravity discharge is not possible.

CHLORINE TABLETS

3" size used on all MC Models
$175/bucket (50 lbs.)

F.O.B. Willits, California
Terms: Net 30 Days

Represented By:

Century
Marine & Industrial Co.
P.O. BOX 3129
SAN FRANCISCO, CA 94119
(415) 431-2211

APPENDIX X

TELEPHONE CONTACT AMO MEETING

REPORTS

NAVFAC Contract J.O. 04072-010000
Phone Calls

Walter Dailey - OPNAV OP43 - (202) 695-1332 - Yard Craft

Capt. W.D. Sayer - NAVSEA 04P - (804) 393-3292 - Reserve Fleet

Robert Dryan - MarAd - (202) 377-5364 - Reserve Fleet

Adler - MSC - (202) 282-2629 (Abrahamson's Assistant)

Gordon Catron - West Coast OPS (MSC) - (415) 466-5906

John Burk - East Coast OPS (MSC) - (201) 858-7431

Lue Tippet (Mr. Hylind) Fleet Support (MSC) - (202) 282-2891

Howard Craddock (MSC) - (202) 282-2902 - Dept. Asst. Chief

Capt. Robert Croder - (202) 607-6509

Wayne Knight - Charlston MSY Gen Plans - Yard Craft - (803) 743-4545

Capt. Galston - MarAd - Suisun Bay Rep. - (415) 556-6233

John Pottinger - Fleet Super - Suisun Bay - (707) 745-0487

Howard Hogue - Tide Water Marine - Santa Barbara - (805) 963-1774

John Turner - Pacific Tow Boat - Long Beach - (213) 432-6487

(Capt.) George B. Phillips - Seacon - (804) 464-7362

Mr. John Mallahan - ABS - (804) 247-3697

Telephone Conversation with Mr. Howard Hogue of Tidewater Marine (Santa Barbara, California) and Jim Schaff, GMDI, 24 February 1978

- Currently 2-218' offshore work boats are available on the West Coast.
- Only a few others here or in Hawaii.
- Brochure is being sent to me.
- Day rate 5.5 to 6.5K depending on crew.
- Acquision cost approximately 7M.
- Berthing for 20-21 and some day accommodations, crew size 11.
- 195'-work boats would go for about 4K/day including crew.
- Availability at any specific time would be highly variable, but in gulf states, one could lease 195' (more available) on 90 days notice, 200+' on 6 month basis.
- During rigging/outfitting and unrigging periods (would request hull to be returned to original) day rate would go down about 1K.

Meeting with NAVFAC on W.C. Platform, 1 March 1978

In attendance

NAVFAC	Jean Herrington	Economic Anal
"	Al Sutherland	Const Division (aboard Seacon)
"	Ron Knight	Adv Planning
"	Shun Ling	Anal Branch
"	Chuck Bodey	Design Div
"	CDR Ron Echul	FPO-1
"	CDR Jim Osborn	PC-2 NAVFAC H.Q.
"	Fred Agdern	FPO Rep on Seacon Const/Conv
GMDI	Jim Schaff	

Basic Topics Covered

- Presented the results of the study to date and as to status of the project.

- Discussed the driving criteria covered in the scenarios.

  - The 66 days of Scenario 1 was much too stringent and during performance of the Scenario was accomplished by returning to port every other day (or so).

  - Discussion followed and 30 to 60 days endurance was considered appropriate.

  - 50 berthing size appropriate.

  - Hull's size ABV 200' needed (<300').

- The use of porta-camps should be considered.

- Discussion of the configurations and trade-offs between alternates.

  - Type of propulsion/positioning devices

    (1) for YFNB

    (2) existing propulsion

  - Advantages/disadvantages of obtaining a hull with existing propulsion.

    (1) machinery exists/possible reduced costs

    (2) may be old and increase maintenance costs

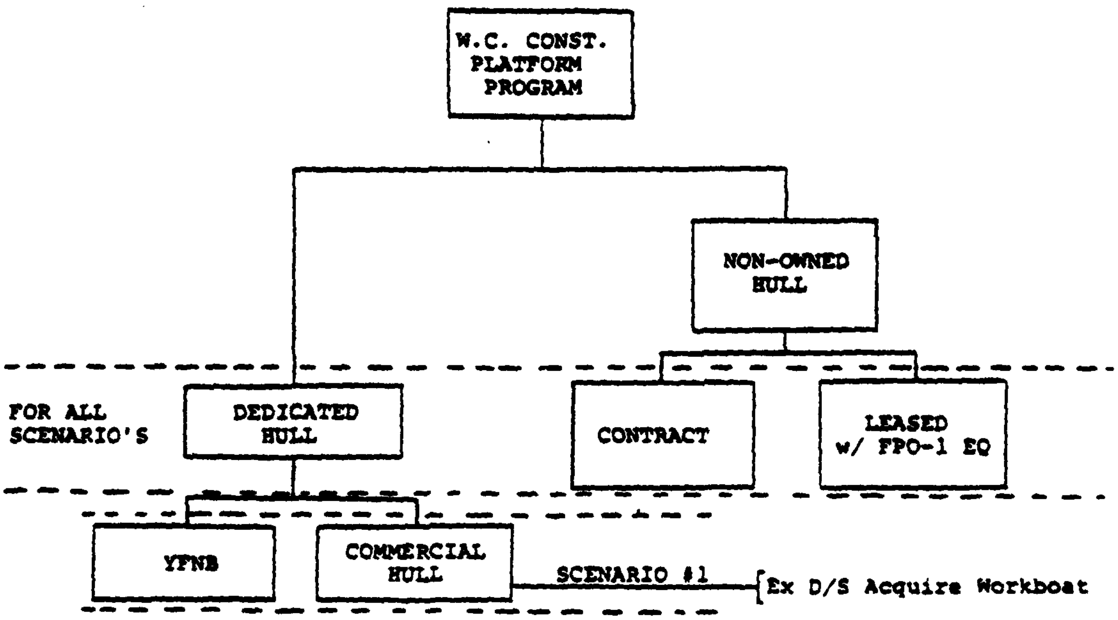
  - Working over side and bow against over stern and side.

- Meet USCG/ABS or US Navy standards. USCG where not costly or inconvenient.
- Use Glomar II class as example of small D/S hull available and remove indication of GMI owned hull!
- Stability data to come from FPO-1
  - If not available (est)
    - (1) Seacon stable
    - (2) Current Seacon anti-roll tanks approximately 50% under sized

Results

- Continue preliminary design procedure with
  - (1) YFNB
  - (2) Commercial hull - ex small drillship - workboat purchase
- Complete matrix with dollars (2nd ext on C1 hull included) and reasoning behind selection criteria.

Procedure



MATRIX

	DEDICATED HULL	LEASE	(COST +) CONTRACT
Hull Modif. Costs	$	-0-	-0-
Outfit	$	$	$
Performance			
• Crew	$	$	$
• Fuel & Water	$	$	$

TOTAL	$______	$______	$______

MEETING WITH NAVFAC ON W.C.O.C.P. - 20, 21 APRIL 1978

In Attendence

Ron Knight - NAVFAC
Jean Herrington - NAVFAC
CDR John Stamn - NAVFAC

Harold Ramsden - GMDI
Jimmy Walker - GMDI
Doug Simpson - GMDI
Jim Schaff - GMDI

Summary of Items Discussed

- Briefed Cdr Stamn on project and results to date.
- Went over economic data developed to date on Scenario 1. General direction items discussed:
  - Lease option is to utilize Navy personnel for construction work and FPO-1 inventory of equipment.
  - Contract option is to be treated as GMDI proposal with appropriate (listed) assumptions. No government assets will be utilized, only government representative on site.
  - Assumptions may take the form of anticipated continuing work for NAVFAC: resale of purchased equipment to NAVFAC after work complete; etc.
  - Scheduling bar charts all to start at beginning of procedure. Lease option start with:
    1. 90 days lead time to lease (below 200') 6 months (above 200') workboat.
    2. Contract phase 9 months to prepare contract, receive bids and award.
    3. Dedicated hull with conversion time.
  - GMDI to supply an estimate escalation rate to be used.
- Specifics discussed on presented data:
  - Leave 30 foot diver boat in Hawaii reducing time to 60 days.
  - "Porta Camp" are Elder's (Houston) and consist of 8 vans, 4 men in each van.

- Boxed figure for crew costs would be used in contract option; use NAVFAC personnel costs for lease option.

- $90K for cable trencher looks like cost without conversion.

- Cable trencher and cementing units are not used much. Do not include for any of the three given scenarios.

• Engineering studies in progress:

  - RAO's and motion data on dedicated hulls.

  - Marine pedestal crane(s) or gantry crane. Dollars for gantry crane: crane $323,863; installation $150 to 200K; rails additional

• The re-mooring of the squaw was discussed. Crawley Marine is to perform utilizing only the two catenary legs, 200' workboat and a 150' tug. NAVFAC to supply to GMDI:

  - Costs for operation

  - Time/Schedule - operations plan

  - Contract prices plus weather window

• The manning levels for government performance of the scenarios was discussed. FPO-1 to get back with their thoughts on this subject.

• An example of the economic life line for the dedicated hull was discussed as the type of analysis FPO-1 will be doing. Also a cost check list and summary sheet was discussed.

• Two figures for the acquisition costs associated with the small drillship have emerged. GMDI will investigate.

• The proposed propulsion/dynamic positioning power was presented and the reasons for the recommendations:

  - Overhaul or exchange Cummings diesels on D/S.

  - Use a 500 HP tunnel thruster forward and a trainable shrouded thruster below the keel aft (D/S).

  - Use below the hull trainable thrusters on YFNB 1-800 forward 2-500 aft.

  - Use diesel generator power with SCR package and DC motors on the thrusters (YFNB).

  - GMDI to provide costs of cycloidal - diesel direct drive.

- The remaining schedule was discussed:
  - Economic data matrix (with exception on Class C estimate on dedicated hull should be complete by end of April).
  - Cost estimates on dedicated hulls (D/S and YFNB) should be available end April - 1st week in May.
  - Reschedule with final draft of project report to be submitted 17 May with completion date 8 June.
  - A final meeting may be necessary around the 26th of May.

TELEPHONE CONVERSATION WITH SEACON SKIPPER, CAPT. PHILLIPS
(804) 464-7362, 0757 15 March 1978

Discussed the required mooring system for NAVFAC type work as based on the experiences of the SEACON.

He felt that the platform should have the capacity to moor in 3000 feet of water on two bow anchors. This system would consist of two drums of 6000 feet each with 1-1/4 inch wire rope. Anchors would be 2500 lb. lightweight type.

Winch pulls should be in the order of 34,000 lbs. and 40,000 lbs. on the inner layer with a speed of 100 F.P.M.

Telephone contact was made with four vendors [illegible] the beginning of May on the propulsion system for [illegible].C.P.:

MR. HERB CHATTERTON OF BIRD-JOHNSON CO. - (2[illegible]) [illegible]-7374

- 500 HP fixed pitch tunnel thruster with out [illegible] or controls = $31,500.00
- 500 HP below the hull mounted fixed pitch, nozzled, trainable = $100,000.00
- 500 HP below the hull thruster with mechanical retraction capability = $155,000.00
- 800 HP below the hull, fixed pitch, trainable, nozzled = $165,000.00
- 800 HP above with retraction capability = $235,[illegible].00

(All above are without motor or controls.)

MR. R.E. UTERMOHLEN OF MURRAY & TREGURTHA - (213) 321-2591

- 500 HP fixed pitch, tunnel thruster = $32,000.00
- 500 HP steerable, nozzled thruster = $90,000.00
- 500 HP steerable with rise and fall capability = $110,000.00
- 800 HP steerable, nozzled thruster = $120,000.00
- 800 HP steerable with rise and fall capability = $220,000.00

MR. ELI SHAPRUT OF VOITH SCHNEIDER, KRUPP INTERNATIONAL, INC. - (914) 381-2000

- 1000 HP, 24G2, cycloidal propeller system complete but without motor 2.4 meters in diameter with 1.650 meter blade length = $316,300.00

MR. TOM SLACK OF PACIFIC ENGINE CATERPILLAR - (714) 279-4230

- D399 marine diesel propulsion with gear box ≈ $174,000.00
- D398 marine diesel propulsion with gear box ≈ $107,000.00
- D379 marine diesel propulsion with gear box ≈ $ 81,000.00
- D398 marine diesel generator ≈ $97,000.00
- D353 marine diesel generator ≈ $50,000.00
- 3408 marine diesel generator ≈ $29,000.00

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